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MT. SINAI HOSPITAL REPORTS

VOLUME V

For 1905 and 1906

EDITED FOR THE MEDICAL BOARD

BY

N. E. BRILL, A.M., M.D.

1907

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1905/06

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ERRATA.

PAGE 3. Line 11. Add the name of *S. Bookman, Ph. D.*, to that of Julius Rudisch, M. D., as joint author.

PAGE 4. Line 6 from bottom. Read *Albert A. Epstein* instead of Albert A. Ryttenberg.

PAGE 9. Line 2. Read June 30th, *1905*, instead of 1907.

PAGE 90. Next to last line. Read *intima* for intimas.

PAGE 364. The Statistical columns should read, *Not operated, Cured, Improved, Unimproved, Died;* instead of Unimproved, Died, Not Operated, Cured, Improved.

PAGE 571. The heading of the page should read, *Canary: New Method of Agar Media Preparation*, instead of Ryttenberg: Ammonium Oxalate in Blood Cultures.

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PREFACE.

In presenting Vol. V of the Mount Sinai Hospital Reports, we do so with a renewed expression of thanks to the Board of Directors of Mount Sinai Hospital, for their co-operation with the Medical Board in the interests both of the patients in the hospital and of the public service to which they have devoted so much of their time.

Their generosity, in supplying the funds necessary for the publication of this volume, has enabled the Medical Board to present to the medical world a little of the vast clinical material, which this large institution offers. We hope that the time is near when this material may be used for the purposes of instruction to medical students and practitioners of medicine. For it is our opinion that until that is done, the hospital will not subserve one of its most useful purposes.

For the past two years a new feature has been in vogue in the conduct of its medical affairs. Once a month "Clinical Conferences" are held in the evening, attended by the entire medical personnel, consisting of the Attending Medical, Surgical, and House Staffs of the hospital, during which cases of exceptional interest are presented and discussed. These have produced increased zeal in all and especially in the members of the House Staff.

A few words of explanation are necessary in reference to a disease which will be found in the Statistics of the Medical Service under the caption of "Auto-intoxication." It represents an infectious disease of definite clinical aspects described by a member of the Medical Board of Mount Sinai Hospital in the New York Medical

Journal, Jan. 8th and Jan. 15th, 1898, having somewhat the picture of typhoid fever, but differing from it, among other things, in its duration, eruption, and its non-fatal results. Persistent attempts to recover an organism from the blood using optima media have failed; whereas in the typhoid fever cases, blood-cultures made at a correspondingly early period have been successful in recovering the typhoid bacillus in about 95% of the cases. No case has as yet shown a positive reaction to agglutination with the typhoid bacillus or bacilli of the paracolon group. Since the year 1898, 182 patients with this form of disease have been under treatment, fifty of whom were treated in the year 1906. The Medical Members of the Attending Staff recognize the inadequate and nondescript character of the name, but for the present continue to classify the disease as "Auto-intoxication."

Since January 1st, 1906, the Medical Service has been divided into two parts, composed of: (*a*)—The First Medical Division under the charge of Dr. J. Rudisch and Dr. N. E. Brill and their Adjuncts, Dr. E. Libman and Dr. D. H. Davison; and (*b*)—The Second Medical Division with Dr. Alfred Meyer and Dr. M. Manges and their Adjuncts, Dr. H. W. Berg and Dr. A. Kohn in charge. The statistics of these two services have therefore been tabulated separately.

N. E. BRILL, A.M., M.D.,
Editor for the Medical Board.

November 6th, 1907.

MEDICAL AND SURGICAL STAFF FOR THE YEARS 1905 AND 1906.

CONSULTING PHYSICIANS.

A. JACOBI, M.D. E. G. JANEWAY, M.D.

CONSULTING SURGEONS.

DANIEL M. STIMSON, M.D. WILLIAM F. FLUHRER, M.D.

ATTENDING PHYSICIANS.

JULIUS RUDISCH, M.D. N. E. BRILL, M.D.
ALFRED MEYER, M.D. MORRIS MANGES, M.D.
HENRY KOPLIK, M.D.
(*Diseases of Children.*)

ADJUNCT ATTENDING PHYSICIANS.

D. H. DAVISON, M.D. HENRY W. BERG, M.D.
E. LIBMAN, M.D. ALBERT KOHN, M.D.
HENRY HEIMAN, M.D.
(*Diseases of Children.*)

ATTENDING SURGEONS.

A. G. GERSTER, M.D. HOWARD LILIENTHAL, M.D.
HERMAN GOLDENBERG, M.D.
(*Genito-Urinary Service.*)

ADJUNCT ATTENDING SURGEONS.

CHAS. A. ELSBERG, M.D. A. V. MOSCHCOWITZ, M.D.
JOSEPH WIENER, M.D. A. A. BERG, M.D.
MARTIN W. WARE, M.D.
(*Genito-Urinary Service.*)

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ADJUNCT GYNAECOLOGISTS.

SAMUEL M. BRICKNER, M.D. HIRAM N. VINEBERG, M.D.

OPHTHALMIC AND AURAL SURGEON.

EMIL GRUENING, M.D.

ADJUNCT OPHTHALMIC AND AURAL SURGEONS.

CHARLES H. MAY. M.D. CARL KOLLER, M.D.

MEDICAL AND SURGICAL STAFF FOR THE YEARS 1905 AND 1906.

(Continued.)

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B. SACHS, M.D.

ADJUNCT NEUROLOGIST.
WILLIAM HIRSCH, M.D.

ATTENDING DERMATOLOGIST.
S. LUSTGARTEN, M.D.

ADJUNCT DERMATOLOGIST.
FRED. J. LEVISEUR, M.D.

ATTENDING LARYNGOLOGIST.
D. B. DELAVAN, M.D.

ADJUNCT LARYNGOLOGIST.
EMIL MAYER, M.D.

ADMITTING PHYSICIAN.
MAX ROSENBERG, M.D.

ADJUNCT ADMITTING PHYSICIAN.
B. SUTRO OPPENHEIMER, M.D.

ADJUNCTS ATTENDING TO ISOLATION SERVICE.

ADJUNCT SURGEON.
LEO B. MEYER, M.D.

ADJUNCT PHYSICIAN,
LOUIS HAUSWIRTH.

RADIOGRAPHIST.
WALTER M. BRICKNER, M.D.

ASSISTANT RADIOGRAPHIST.
ISAAC SETH HIRSCH, M.D.

ANAESTHETISTS.
THOMAS L. BENNETT, M.D.
MYRON P. DENTON, M.D.
CHARLES J. PICK, M.D.

PATHOLOGICAL STAFF.

F. S. MANDLEBAUM, M.D., *Pathologist.*
E. LIBMAN, M.D., *Assistant Pathologist.*
E. P. BERNSTEIN, M.D., *Second Assistant Pathologist.*
HERBERT L. CELLER, M.D., *Laboratory Assistant.*
LEO BUERGER, M.D., *Laboratory Assistant.*
CHAS. RYTTENBERG, M.D., *Pathological Interne.*
SAM BOOKMAN, Ph.D., *Physiological Chemist.*
EDWARD A. ARONSON, M.D., *Assistant Physiological Chemist.*
LOUIS HAUSWIRTH, M.D., *Assistant Physiological Chemist.*

HOUSE STAFF.

From January 1 to June 30, 1907.

MEDICAL.

I. DIVISION.

House,
GEO. W. T. MILLS, M.D.
Senior,
G. A. FRIED, M.D.
Junior,
JULIUS J. HERTZ, M.D.
1*st Externe,*
SOLOMON WIENER, M.D.
2*nd Externe,*
ALFRED E. COHN, M.D.

II. DIVISION.

House,
SAMUEL FELDSTEIN, M.D.
Senior,
LEO KESSEL, M.D.
Junior,
JESSE G. M. BULLOWA, M.D.
1*st Externe.*
ERNST SACHS, M.D.
2*nd Externe,*
LOUIS JACOBS, M.D.

SURGICAL.

House,
SOL. HYMAN, M.D.
Senior,
WILLIAM J. HABER, M.D.,
Junior,
C. M. HATHEWAY, M.D.
1*st Externe,*
MAX TASHMAN, M.D.
2*nd Externe,*
ORVILLE H. SCHELL, M.D.

House,
ISADORE SEFF, M.D.
Senior,
HORACE L. LEITER, M.D.
Junior,
MILTON BODENHEIMER, M.D.
1*st Externe,*
JULIAN J. MEYER, M.D.
2*nd Externe,*
EBEN ALEXANDER, M.D.

PROVISIONALS.

KAUFMAN SCHLIVEK, M.D.
ISIDOR GOLDSTEIN, M.D.

WILLIAM BRANOWER, M.D.
ISADORE KAUFMAN, M.D.

From July 1 to December 31, 1905.

MEDICAL.

House,
G. A. FRIED, M.D.
Senior,
JULIUS J. HERTZ, M.D.
Junior,
JULIAN J. MEYER, M.D.
1*st Externe,*
ALFRED E. COHN, M.D.
2*nd Externe,*
HAROLD NEUHOF, M.D.

House,
LEO KESSEL, M.D.
Senior,
JESSE G. M. BULLOWA, M.D.
Junior,
MAX TASCHMAN, M.D.
1*st Externe,*
LOUIS JACOBS, M.D.
2*nd Externe,*
AMES R. CHAMBERLAIN, M.D.

PROVISIONALS.

A. HYMAN, M.D.
B. REIN, M.D.

KAUFMAN SCHLIVEK, M.D.

SURGICAL.

House,
WILLIAM J. HABER, M.D.
Senior,
C. MORRIS HATHEWAY, M.D.
Junior,
ERNST SACHS, M.D.
1*st Externe,*
ORVILLE H. SCHELL, M.D.
2*nd Externe,*
WALTER J. HEIMAN, M.D.

House,
HORACE LEITER, M.D.
Senior,
MILTON BODENHEIMER, M.D.
Junior,
SOLOMON WIENER, M.D.
1*st Externe,*
EBEN ALEXANDER, M.D.
2*nd Externe,*
LOUIS KAEMPFER, M.D.

HOUSE STAFF.

(Continued.)

From January 1 to June 30, 1906.

MEDICAL.

I. DIVISION.

House,
JULIUS J. HERTZ, M.D.
Senior,
JULIAN J. MEYER, M.D.
Junior,
ALFRED E. COHN, M.D.
1st Externe,
HAROLD NEUHOF, M.D.
2nd Externe,
J. WISANSKY, M.D.
Provisionals,
A. HYMAN, M.D. B. REIN, M.D.

II. DIVISION.

House,
JESSE G. M. BULLOWA, M.D.
Senior,
MAX TASCHMAN, M.D.
Junior,
LOUIS JACOBS, M.D.
1st Externe.
AMES R. CHAMBERLAIN, M.D.
2nd Externe,
R. W. PETTIT, M.D.
Provisional
KAUFMAN SCHLIVEK, M.D.

SURGICAL.

House
C. MORRIS HATHEWAY, M.D.
Senior,
ERNST SACHS, M.D.
Junior,
ORVILLE H. SCHELL, M.D.
1st Externe,
WALTER J. HEIMANN, M.D.
2nd Externe,
JOHN C. A. GERSTER, M.D.

House,
MILTON BODENHEIMER, M.D.
Senior.
SOLOMON WIENER, M.D.
Junior,
EBEN ALEXANDER, JR., M.D.
1st Externe,
LOUIS KAEMPFER, M.D.
2nd Externe,
HAROLD HAYS, M.D.

PROVISIONALS.

P. FIASCHI, M.D.
I. RUBIN, M.D.

MAX SHAYER, M.D.
ABRAHAM JAFFIN, M.D.

PRIVATE HOSPITAL STAFF.

EDWIN A. RIESENFELD, M.D., *Resident Physician.*
WILLIAM BRANOWER, M.D., *Assistant Resident Physician.*
CHARLES EDWIN SHAY, M.D., *Second Asst. Resident Physician.*

From July 1 to December 31, 1906.

MEDICAL.

Home,
JULIAN J. MEYER, M.D.
Senior,
ALFRED E. COHN, M.D.
Junior,
LOUIS KAEMPFER, M.D.
1st Externe,
J. WISANSKY, M.D.
2nd Externe,
JOSEPH ROSENTHAL, M.D.

House,
MAX TASCHMAN, M.D.
Senior,
LOUIS JACOB, M.D.
Junior,
WALTER J. HEIMANN, M.D.
1st Externe.
ABRAHAM JAFFIN, M.D.
2nd Externe,
ISIDOR RUBIN, M.D.

SURGICAL.

House,
ERNST SACHS, M.D.
Senior,
ORVILLE H. SCHELL, M.D.
Junior,
AMES R. CHAMBERLAIN, M.D.
1st Externe,
JOHN C. A. GERSTER, M.D.
2nd Externe,
ALBERT A. EPSTEIN, M.D.

House,
SOLOMON WIENER, M.D.
Senior,
EBEN ALEXANDER, JR., M.D.
Junior,
HAROLD NEUHOF, M.D.
1st Externe,
HAROLD HAYS, M.D.
2nd Externe,
MAX SHAYER, M.D.

DEPARTMENT OF INTERNAL MEDICINE

STATISTICS OF MEDICAL SERVICE DURING 1905.

ATTENDING PHYSICIANS.

J. Rudisch, M.D. — N. E. Brill, M.D.
Alfred Meyer, M.D. — Morris Manges, M.D.

ADJUNCT ATTENDING PHYSICIANS.

D. H. Davison, M.D. — H. W. Berg, M.D.
E. Libman, M.D. — Albert Kohn, M.D.

TOTAL OF ALL CASES TREATED IN DEPARTMENT OF INTERNAL MEDICINE FOR YEAR 1905

Treated	1,081
Cured	387
Improved	437
Unimproved	96
Died	161

General Diseases.	Cured		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Acromegaly with diabetes and nephritis	...	..	..	..	..	..	1	..	1	...
Arthritis—chronic	...	..	1	..	..	..	..	..	1	...
" chronic infectious	...	..	3	..	..	..	..	..	3	...
" deformans	...	..	..	3	..	1	..	..	...	4
" deformans with chronic bronchitis	...	..	..	1	..	..	..	..	...	1
" Still's disease	...	..	..	1	..	..	..	..	..	1
" gonorrheal	1	1	1	..	..	..	..	..	2	1
Carcinoma of thyroid	...	..	..	..	..	1	..	..	...	1
Diabetes insipidus	...	..	1	..	..	..	..	..	1	...
Diabetes mellitus	...	1	2	2	..	..	..	..	2	3
" " with chronic endocarditis	1	..	..	..	..	..	..	..	1	...
" " with carcinoma of liver and nephritis	...	..	..	..	..	..	1	..	1	...
" " with ovarian cyst	...	..	..	..	..	1	..	..	...	1
" " with pneumonia	...	..	..	..	..	..	..	1	...	1
" " with post-polar cataract	...	..	..	..	..	..	1	..	1	...
" " with pulmonary tuberculosis	...	..	..	..	..	..	1	1	1	1
" " with coma	...	..	..	..	..	..	1	..	1	...
Diphtheria	...	6	..	..	..	..	..	..	...	6
" with chronic endocarditis	...	..	..	..	..	1	..	..	...	1
" bacteriological	...	4	..	..	..	..	..	..	...	4
Exophthalmic goitre	...	..	2	1	..	..	..	..	2	1
" " with chronic endocarditis	...	..	..	..	..	1	..	..	...	1
General carcinomatosis	...	..	..	..	..	..	..	1	...	1

General Diseases—*(Continued).*	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Gout with chronic nephritis	1	..	..	..	..	..	..	..	1	...
Influenza	22	9	1	..	..	..	..	..	23	9
" abdominal	1	..	..	..	..	..	..	..	1	...
" frontal sinusitis	...	1	..	..	..	..	..	..	...	1
" with subacute rheumatism	2	..	..	..	..	..	..	..	2	...
" debility	...	1	..	..	..	..	..	..	...	1
Intermittent glycosuria	...	..	1	..	..	..	..	..	1	...
Malaria—Tertian	4	..	..	..	..	..	..	..	4	...
Measles	...	..	..	1	..	..	..	..	...	1
Menière's disease	...	..	..	1	..	..	..	..	...	1
Meningitis—Cerebro-spinal	4	5	..	2	..	..	4	6	8	13
" cerebro-spinal with lobar pneumonia.	...	1	..	..	..	..	..	1	...	2
" pneumococcus	...	..	..	..	..	..	..	1	...	1
" serous, of otitic origin	...	..	..	..	..	..	1	..	1	...
" streptococcus mucosus	...	..	..	..	..	..	..	1	...	1
" tuberculous	...	..	..	..	..	..	4	2	4	2
Miliary—Tuberculosis, chronic	...	..	2	1	..	..	..	..	2	1
" " subacute	...	..	3	..	1	..	..	..	4	...
Multiple neoplasm	...	..	..	..	..	..	1	..	1	...
Paratyphoid fever	1	..	..	..	..	..	..	..	1	...
Peritonsilitis, acute	...	1	..	..	..	..	..	..	...	1
Peliosis rheumatica	...	1	..	..	..	..	..	..	...	1
Polyserositis	...	..	1	..	..	..	..	..	1	...
Puerperal sepsis	...	..	..	..	..	..	..	1	...	1
Purpura—Henoch's	...	..	1	..	..	..	..	..	1	...
Pyemia—septic	...	..	..	..	..	..	1	..	1	...
Rheumatism—Acute articular	9	..	..	6	..	..	..	..	9	6
Acute articular with aortitis	...	1	..	..	..	..	..	..	...	1
" " with chronic endocarditis.	4	3	..	1	..	..	..	..	4	4
" " with dry pleurisy	1	1	..	1	..	..	..	..	1	2
" " with furunculosis	1	..	..	..	..	..	..	..	1	...
" " with hysteria	...	..	..	1	..	..	..	..	...	1
Chronic	...	..	2	4	..	..	..	..	2	4
" with endocarditis	...	..	4	..	..	..	..	..	4	...
" with endocarditis and pericarditis	...	..	..	..	..	..	..	1	...	1
Subacute articular	6	6	13	3	..	2	..	..	19	11
" articular with chronic endocarditis	1	..	1	1	..	..	..	..	2	1
" articular with neurasthenia	...	..	..	2	..	..	..	..	...	2
" articular with pleurisy	...	..	..	1	..	..	..	..	...	1
Sarcoma—Retroperitoneal metastatic	...	..	..	..	1	..	..	..	1	...
Neoplasm—Anterior mediastinum	...	..	..	..	1	..	..	..	1	...
Syphilis—Tertiary	1	1	4	2	..	..	..	..	5	3
" " with sepsis	...	..	..	..	..	..	1	..	1	...
Syphilitic laryngitis and hepatitis	...	..	..	1	..	..	..	..	...	1
" osteomyelitis	...	..	1	..	..	..	..	..	1	...
" periostitis	1	..	..	..	..	..	..	..	1	...
Tonsillitis—Acute parenchymatous	...	1	..	..	..	..	..	..	...	1
" acute follicular	5	1	..	..	..	..	..	..	5	1

General Diseases—*(Continued).*	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Typhoid fever	36	37	..	..	..	..	3	1	39	38
With relapse	3	3	..	..	..	..	..	..	3	3
" meningismus	1	..	..	..	..	..	..	..	1	...
" acute bilateral mastoiditis	...	..	..	..	..	..	1	..	1	...
" fibroid uterus	...	1	..	..	..	..	..	..	...	1
" furunculosis	...	1	..	..	..	..	..	..	...	1
" gonorrheal arthritis and orchitis	1	..	..	..	..	..	..	..	1	...
" intestinal hemorrhage	...	1	..	..	..	..	..	1	...	2
" leg abscess	...	1	..	..	..	..	..	..	...	1
" otitis media and dementia	1	..	..	..	..	..	..	..	1	...
" perforation and peritonitis	...	..	..	..	..	..	..	1	...	1
" pelvic abscess	...	1	..	..	..	..	..	..	...	1
" tachycardia	...	1	..	..	..	..	..	..	...	1
Total	106	93	45	36	3	7	21	19	175	155
Blood Diseases.										
Anemia, secondary	...	..	..	1	..	1	..	..	...	2
Secondary, due to bothriocephalus latus	...	..	..	1	..	..	..	..	...	1
" due to hemophilia	...	..	1	..	..	..	..	..	1	...
" with pulmonary edema	...	..	..	..	..	..	1	..	1	...
Chlorosis	...	..	..	1	..	..	..	..	...	1
" with hysteria	...	1	..	..	..	..	..	..	1	...
Hodgkin's disease, with furunculosis	...	..	..	..	1	..	..	..	1	...
Leukæmia—Acute lymphatic	...	..	1	..	..	1	..	..	1	1
Acute lymphatic—chloroma	...	..	..	..	..	..	1	..	1	...
Chronic lymphatic	...	..	1	..	..	..	..	..	1	...
" " with chronic endocarditis	...	..	..	..	1	..	..	..	1	...
Splenomyelogenous	...	..	1	..	2	..	1	..	4	...
" " with meningitis	...	..	1	..	..	..	..	..	1	...
Total	...	1	5	3	4	2	3	..	12	6
Diseases of the Respiratory Tract.										
Asthma	...	..	..	..	..	1	..	..	...	1
Bronchial	1	..	..	..	..	..	..	..	1	...
" with deviated septum	...	1	..	..	..	..	..	..	...	1
Bronchitis—Acute	1	3	1	..	..	..	..	..	2	3
Chronic	...	..	..	2	1	..	..	..	1	2
" with emphysema	...	..	6	..	..	..	..	..	6	...
Cavity of lung	...	..	..	..	1	..	..	..	1	...
Emphysema	1	..	1	1	..	..	..	..	2	1
With asthma	...	..	1	..	..	..	..	..	1	...
" bronchitis and myocarditis	...	..	..	1	..	..	..	..	...	1
" chronic bronchitis	...	..	6	2	..	..	..	..	6	2
" perforation through lung	...	..	..	..	..	..	1	..	1	...
" pulmonary tuberculosis	...	..	1	..	..	..	..	..	1	...
Laryngitis—Acute	...	1	..	..	..	..	..	..	...	2
Pleura—Tumor	...	..	..	1	..	1	..	..	...	2

Diseases of the Respiratory Tract *(Continued).*	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Pleurisy—Acute, chronic bronchitis	1	..	..	..	..	..	..	..	1	...
Chronic hypertrophic	...	..	1	..	..	..	..	..	1	...
Dry	1	3	..	..	..	1	..	..	1	4
" with bronchitis	...	1	..	..	..	..	..	..	...	1
" with neurasthenia	...	..	..	1	..	..	..	..	...	1
" with tuberculosis	...	..	..	1	..	..	..	..	...	1
With effusion	3	5	3	..	..	..	..	..	6	5
" " and pericarditis	...	1	..	..	..	..	..	..	...	1
Rheumatic	...	1	..	..	..	..	..	..	...	1
Pneumonia—Broncho	...	3	..	..	..	..	3	1	3	4
Lobar	10	10	..	..	..	..	8	..	18	10
With delayed resolution	2	..	..	..	..	..	..	..	2	...
" chronic endocarditis	...	..	..	..	..	..	..	1	...	1
" myocarditis	...	..	..	..	..	..	1	..	1	...
" pleurisy	3	..	..	..	..	..	..	..	3	...
Central	...	1	..	..	..	..	..	..	...	1
Influenza	14	8	1	..	..	..	..	..	15	8
" with pleurisy	...	1	..	..	..	..	..	..	...	1
Tubercular	...	..	..	..	..	..	1	..	1	...
Pulmonary actinomycosis	...	..	..	..	..	..	..	1	...	1
" hemoptysis	...	..	1	..	..	..	..	..	1	...
Tuberculosis—Pulmonary	...	..	27	20	1	..	6	6	34	26
Pulmonary with argyria	...	..	..	..	..	..	1	..	1	...
With acute endocarditis	...	..	..	1	..	..	..	..	...	1
" cardiac anomaly	...	..	1	..	..	..	..	..	1	...
" chronic rheumatism	...	..	..	1	..	..	..	..	...	1
" emphysema	...	..	1	..	..	..	..	..	1	...
" hemoptysis	...	..	1	1	..	..	..	..	1	1
" pleural effusion	...	..	1	..	..	..	..	..	1	...
" pneumothorax	...	..	1	..	..	..	..	1	1	1
" pyopneumothorax	...	..	..	2	1	..	..	..	1	2
" unresolved pneumonia	...	..	..	..	1	..	..	..	1	...
Tumor of lung and mediastinum	...	..	1	..	..	..	..	..	1	...
Total	37	39	55	34	5	3	21	10	118	86
Diseases of the Circulatory System. *Heart.*										
Endocarditis—Acute	...	..	..	1	..	..	..	..	...	1
Chronic	...	..	24	28	..	2	4	6	28	36
" with acute articular rheumatism	...	..	2	..	..	..	..	..	2	...
" with aneurism of femoral artery	...	..	..	..	..	..	1	..	1	...
" with asthma	...	..	..	1	..	..	..	..	...	1
" with bronchitis	...	..	..	1	1	..	..	..	1	1
" with cerebral embolism and phlebitis	...	..	..	..	..	..	1	..	1	...
" with cirrhosis of liver	...	..	..	..	..	1	..	..	...	1

Diseases of the Circulatory System—*(Continued).*	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
" with cirrhosis of liver and nephritis	...	..	1	..	..	..	..	..	1	...
" with broncho-pneumonia	...	..	..	1	..	..	..	1	...	2
" with erythema nodosum	...	..	..	1	..	..	..	..	...	1
" with hepatitis	...	..	..	..	..	..	1	..	1	...
" with hemiplegia	...	..	..	..	1	1	..	..	1	1
" with incipient pulmonary tuberculosis	...	..	1	..	..	..	..	..	1	...
" with myocarditis	...	..	..	..	..	..	1	..	1	...
" with myocarditis and cirrhosis of liver	...	..	1	..	..	..	..	..	1	...
" with myocarditis, nephritis and hydrothorax	...	..	2	1	..	..	..	..	2	1
" with nephritis	...	..	3	3	2	..	3	2	8	5
" with acute pericarditis	...	..	1	1	..	..	..	1	1	2
" with pleurisy	...	..	2	4	..	..	..	..	2	4
" with phlebitis	...	..	..	1	..	..	..	..	...	1
" with pregnancy	...	..	..	1	..	..	..	..	...	1
" with pulmonary edema	...	..	..	..	..	..	2	..	2	...
" with pulmonary infarct	...	..	1	2	..	..	..	..	1	2
" with subacute articular rheumatism	...	..	6	6	..	..	..	..	6	6
" with tricuspid insufficiency	...	..	..	..	..	..	..	1	...	1
Malignant	...	..	..	..	..	..	2	..	2	...
Subacute	...	..	..	..	..	..	..	1	...	1
Myocarditis	...	..	3	..	1	..	..	..	4	...
With emphysema	...	..	1	..	..	..	..	..	1	...
Blood Vessels.										
Aneurism—Aortic arch	...	..	1	..	..	..	..	..	1	...
Aortic arch, chronic endocarditis—pleurisy with effusion	...	..	1	..	..	..	..	..	1	...
Arterio-sclerosis with chronic nephritis	...	..	..	1	1	..	..	..	1	1
With chronic nephritis and uremia	...	..	..	..	..	..	..	1	...	1
" hemiplegia	...	..	..	..	..	..	1	..	1	...
" intermittent claudication	...	..	..	..	1	..	..	..	1	...
" Menière's disease	...	..	1	..	..	..	..	..	1	...
" muscular spasm	...	..	..	..	1	..	..	..	1	...
" neuralgia	...	..	1	..	..	..	..	..	1	...
" senile dementia	...	..	..	1	..	..	..	..	...	1
" subacute articular rheumatism	...	..	1	..	..	..	..	..	1	...
Erythromelalgia	...	..	..	..	1	..	..	..	1	...
General endarteritis with emphysema	...	..	..	..	1	..	..	..	1	...
Obliterating phlebitis	1	..	..	..	..	..	..	..	1	...
Raynaud's disease	...	..	1	..	..	..	..	..	1	...
Total	1	..	54	54	10	4	16	13	81	71

Diseases of Digestive Tract.	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Autointoxication	19	15	..	..	..	..	1	..	20	15
Cholera nostras	1	..	..	..	..	..	..	..	1	...
Colitis—Acute	2	4	..	..	..	..	..	..	2	4
Subacute	...	1	..	..	..	..	..	..	...	1
Chronic	1	1	..	2	..	..	..	..	1	3
Neurasthenia	...	..	..	..	..	1	..	..	...	1
Amebic	...	..	..	..	1	..	..	..	1	...
Colon—Tumor of	...	..	..	..	1	..	..	..	1	...
Constipation	...	..	1	..	..	..	..	..	1	...
With neurasthenia	1	..	..	..	..	..	..	..	1	...
Duodenum—Ulcer	...	..	1	..	..	..	..	..	1	...
Enteritis—Asthenia	...	..	..	..	..	..	..	1	...	1
Enteralgia	...	..	..	1	..	..	..	..	...	1
Gall Bladder—Biliary colic	...	1	..	..	..	..	..	..	...	1
Carcinoma of	...	..	..	..	..	..	1	..	1	...
Catarrhal jaundice	...	..	1	..	..	..	..	..	1	...
Cholangitis	1	..	..	..	..	..	..	..	1	...
Inflammation (cholecystitis)	...	..	1	..	..	..	..	..	1	...
Subacute inflammation (cholecystitis)	...	1	..	..	..	..	..	..	...	1
Cholelithiasis—cholecystitis	...	..	..	..	..	..	..	1	...	1
Cholelithiasis	1	..	..	3	..	..	..	..	1	3
Cholelithiasis—stone in common duct	...	..	..	1	..	..	..	..	...	1
Hepatitis—Syphilitic	...	..	..	..	..	..	..	1	...	1
With chronic splenitis	...	..	..	..	..	1	..	..	...	1
Helminthiasis	...	..	..	1	..	..	..	..	...	1
Intestinal carcinoma	...	..	..	1	..	..	..	..	...	1
Intestinal hemorrhage	...	..	1	..	..	..	..	..	1	...
Intestinal intoxication	1	..	..	..	..	..	..	..	1	...
Intestinal obstruction—chronic	...	..	..	..	..	1	..	..	...	1
Liver abscess	...	..	..	..	1	..	..	..	1	...
Abscess with appendicitis	...	..	..	..	..	..	1	..	1	...
Biliary cirrhosis	...	..	1	..	..	..	..	..	1	...
Carcinoma	...	..	..	1	..	..	..	..	...	1
Secondary malignant neoplasm	...	..	..	..	1	..	..	..	1	...
Tumor of	3	..	1	..	..	..	..	..	4	...
Cirrhosis	...	..	2	..	..	1	2	..	4	1
Cirrhosis with ascites	...	..	1	..	..	..	..	..	1	...
Cirrhosis with chronic endocarditis	...	..	1	..	..	..	..	..	1	...
Cirrhosis with hydropneumothorax	...	..	1	..	..	..	..	..	1	...
Cirrhosis with omentopexy	...	..	..	..	..	..	..	1	...	1
Splenomegaly (Gaucher)	...	..	1	..	..	..	..	..	1	...
Pancreas—Acute pancreatitis	1	..	..	..	..	..	..	..	1	...
Carcinoma of head	...	..	..	..	..	..	1	..	1	...
Omentum—Carcinoma	...	..	..	..	..	..	1	..	1	...
Esophagus—Carcinoma	...	..	..	..	1	1	1	..	2	1
Stricture	...	..	1	..	..	..	..	..	1	...
Peritoneum—Carcinoma of	...	..	..	..	..	..	1	..	1	...

Diseases of Digestive Tract—*(Continued).*	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Tuberculosis of	...	..	1	..	..	..	1	..	2	...
Rectal bleeding	...	..	..	1	..	..	..	..	...	1
Rectum—Carcinoma	...	..	..	..	..	..	..	2	...	2
Sigmoid—Carcinoma	...	..	..	..	..	..	1	..	1	...
Spleen—Primary cysto-sarcoma	...	..	1	..	..	..	..	..	1	...
Stomach—Acute indigestion	...	1	..	..	..	..	..	..	...	1
Carcinoma	...	..	3	..	3	1	2	1	8	2
Carcinoma with carcinoma of papilla of Vater and chronic pancreatitis	...	..	..	..	..	..	1	..	1	...
Carcinoma of liver with suppurating parotitis	...	..	..	..	..	..	..	1	...	1
Gastritis—Acute	1	..	..	..	..	..	..	..	1	...
Gastritis—Subacute	...	..	3	..	..	..	..	..	3	...
Gastritis—Subacute with emphysema	...	..	1	..	..	..	..	..	1	...
Gastritis—Atrophic	...	..	..	1	..	..	..	..	...	1
Gastritis—Chronic	...	..	3	1	..	..	..	..	3	1
Gastric indigestion with flat foot	...	..	..	1	..	..	..	..	...	1
Hematemesis and petit mal	1	..	..	..	..	..	..	..	1	...
Hyperchlorhydria nervosa	...	1	..	..	..	..	..	..	...	1
Neurosis	1	3	7	3	..	..	..	..	8	6
" with mucous colitis	...	..	..	1	..	..	..	..	...	1
Nervosa Hyperchlorhydria	...	1	..	..	..	..	..	..	...	1
Subacute with emphysema	...	..	1	..	..	..	..	..	1	...
Ulcer	2	1	..	3	..	1	..	..	2	5
" with hysteria	...	..	..	1	..	..	..	..	...	1
Vomiting of pregnancy	...	2	..	..	..	..	..	..	...	2
Total	36	35	32	26	10	6	14	9	92	76
Genito-Urinary Diseases.										
Epididymo-orchitis	1	..	..	..	..	..	..	..	1	...
Hypospadias	...	..	..	..	1	..	..	..	1	...
Nephritis—Acute hemorrhagic	...	..	1	..	..	..	..	..	1	...
Subacute	...	..	2	..	..	..	1	..	3	...
Chronic	...	..	28	19	..	17	5	4	33	40
" acute pericarditis, uremia	...	..	..	..	..	1	..	..	...	1
" cerebral embolism, hemiplegia	...	..	..	1	..	..	..	..	...	1
" cerebral hemorrhage	...	..	..	..	..	..	..	1	...	1
" endocarditis	...	..	..	1	..	..	..	..	...	1
" cystitis	...	..	..	..	..	..	..	1	...	1
" emphysema	...	..	2	1	..	..	2	..	4	1
" muscular rheumatism	...	..	1	..	..	..	..	..	1	...
" myocarditis	...	..	2	1	..	..	2	1	4	3
" dry pleurisy	...	..	..	2	..	..	..	..	...	2
" pleurisy with effusion	...	..	1	1	..	..	..	..	1	1
" pulmonary infarct	...	..	..	..	..	..	1	..	1	...
" stomatitis	1	..	..	..	..	..	..	..	1	...

Genito-Urinary Diseases—*(Continued).*	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Chronic subacute articular rheumatism	...	..	1	..	..	..	..	..	1	...
" uremia	...	..	..	..	..	..	4	1	4	1
" uremia—myocarditis	...	..	..	..	1	..	..	..	1	...
" uremia—pulmonary edema	...	..	..	..	..	..	..	1	...	1
Nephrolithiasis	...	..	1	1	..	1	..	..	1	2
Nephroptosis	...	..	..	1	..	..	..	..	...	1
Ovarian cyst	...	..	..	1	..	..	..	..	...	1
Pyelitis	...	2	..	..	..	1	..	..	...	3
Pyonephrosis, double	...	..	..	..	..	1	..	..	...	1
" single	...	..	..	..	..	..	..	1	...	1
Renal colic	5	1	1	..	..	..	..	..	6	1
" neoplasm	...	..	..	1	..	..	..	1	...	2
Ren mobilis	...	..	2	..	..	3	..	..	2	3
Tumor of testis—malignant	...	..	..	..	1	..	..	..	1	...
Uterus—Retroflexion	...	1	..	..	..	..	..	..	...	1
Uremia	...	..	1	..	..	..	2	2	3	2
Total	7	4	43	30	3	24	17	13	70	71
Diseases of the Nervous System.										
Acute sclerosis with dementia	...	..	..	1	..	..	..	..	...	1
Amaurosis	...	..	..	..	..	..	..	1	...	1
Brain tumor—cerebral	...	..	..	..	1	..	2	3	3	3
Brain abscess—otitic origin	...	..	1	..	..	..	..	..	1	...
Cerebellar tumor	...	..	..	..	1	1	..	1	1	2
Cerebral embolism	...	..	2	..	..	..	..	..	2	...
" hemorrhage	1	..	..	5	1	..	3	2	5	7
" thrombosis	...	..	3	..	1	..	3	..	7	...
" monoplegia	...	..	..	1	..	..	..	..	...	1
Cerebro-spinal syphilis	...	..	1	..	..	..	..	..	1	...
Chorea minor	...	3	..	2	..	..	..	..	...	5
Chorea minor, with chronic endocarditis	...	1	..	..	..	..	..	..	...	1
Chorea minor, with melancholia and typhoid spine	...	1	..	..	..	..	..	..	...	1
Chorea insaniens	...	..	..	..	..	..	..	1	...	1
Combined sclerosis	...	..	1	..	..	..	..	..	1	...
Dementia	...	..	..	..	..	1	..	..	...	1
" precox	...	..	..	..	..	2	..	..	...	2
Epilepsy	...	..	..	..	..	1	..	1	...	2
General paresis	...	..	..	..	2	..	..	..	2	...
Hebephrenia	...	..	..	1	..	..	..	..	...	1
Hemicrania syphilitica	...	..	..	1	..	..	..	..	...	1
Hypochondriasis	...	..	..	1	..	..	..	..	...	1
Hysteria	...	1	..	4	..	2	..	..	...	7
Hystero-epilepsy	...	..	..	..	..	1	..	..	...	1
Lumbago	2	2	..	..	..	..	..	..	2	2
Mania acute	...	..	..	1	..	..	..	..	...	1

	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Diseases of the Nervous System— *(Continued).*										
Migraine	...	..	1	..	..	..	..	..	1	...
Multiple sclerosis	1	..	1	2	..	1	1	..	3	3
Myalgia	1	..	..	..	..	..	..	..	1	...
Myotonia	...	..	2	..	..	..	..	..	2	...
Neuralgia—Brachial	...	..	..	..	..	1	..	..	...	1
Cervical	...	..	..	1	..	..	..	..	...	1
Facial	...	1	1	1	..	..	..	..	1	2
Sciatic	5	7	7	2	..	..	..	..	12	9
Supraorbital	...	..	1	..	..	..	..	..	1	...
Neurasthenia	3	5	9	17	1	1	..	..	13	23
Neuritis—Alcoholic	1	1	..	..	..	..	..	..	1	1
Multiple—Karsakoff's psychosis	...	1	..	..	..	..	..	..	...	1
Neurosis—Abdominal	...	1	..	..	..	..	..	..	...	1
Traumatic	...	..	..	1	..	..	..	..	...	1
Ophthalmoplegia—Chronic	...	..	..	1	..	..	..	..	...	1
Paralysis Agitans	...	..	..	1	1	..	1	..	2	1
Polyneuritis—cause unknown	...	..	1	..	..	..	..	..	1	...
Progressive muscular atrophy and dystrophy.	1	..	..	..	..	..	..	..	1	...
Syringomyelia	...	..	1	..	..	..	..	..	1	...
Tabes dorsalis	...	..	..	1	..	..	1	1	1	2
Torticollis	...	..	..	2	1	..	..	..	1	2
Tuberculosis of spinal cord	...	..	1	..	..	..	..	..	1	...
Total	15	24	33	46	9	11	11	10	68	91
Surgical Diseases.										
Abdominal tumor	...	..	..	..	1	1	..	1	1	2
Acute appendicitis with abscess	...	1	..	..	..	..	..	..	...	1
Arteriosclerotic gangrene—fingers	...	..	1	..	..	..	..	..	1	...
Arteriosclerotic gangrene—foot	...	..	1	..	..	..	..	..	1	...
Carcinoma of pelvic floor	...	..	..	..	..	1	..	..	...	1
Coccycodynia	...	1	..	..	..	..	..	..	...	1
Coccytis—Tuberculous	...	..	..	..	1	..	..	..	1	...
Fibroid-uterus	...	..	..	1	..	..	..	..	...	1
Fracture of femur	...	1	..	..	..	..	..	..	...	1
Hematoma of popliteal space	1	..	..	..	..	..	..	..	1	...
Hemorrhoids	1	..	..	..	..	..	..	..	1	...
Hypertrophied tonsils and deflected septum	1	..	..	..	..	..	..	..	1	...
Inguinal abscess	...	..	..	..	..	1	..	..	...	1
Infected wound of foot	1	..	..	..	..	..	..	..	1	...
Pelvic peritonitis	...	..	..	1	..	..	..	..	1	...
Periostitis	1	..	..	..	..	1	..	..	1	1
Peri-articular abscess	1	..	..	..	..	..	..	..	1	...
Pes planus	...	..	1	..	..	1	..	..	1	1
Polypoid degeneration—inferior turbinated bone	...	..	..	..	..	1	..	..	...	1

Skin Diseases.	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Potts' disease	1	..	..	1	..	..	..	..	1	1
Salpingitis	...	..	..	1	..	..	..	..	...	1
Sarcoma of uterus and pelvis	...	..	..	..	..	2	..	..	...	2
Scoliosis	...	..	..	1	..	..	..	..	...	1
Sinus thrombosis	...	..	..	..	..	..	..	1	...	1
Teno-synovitis	1	..	..	..	..	..	..	..	1	...
Traumatic synovitis	...	1	..	..	..	..	..	..	...	1
Tumor of pelvis—intestinal obstruction	...	..	..	..	..	..	..	1	...	1
Total	8	4	3	5	2	8	1	2	14	19
Dysidrosis	1	..	..	..	1	..	..	..	2	...
Eczema	...	..	..	..	1	..	..	..	1	...
" acute	...	1	..	..	..	..	..	..	...	1
" erythematosum	...	..	1	..	..	..	..	..	1	...
" facial	...	..	..	1	..	..	..	..	...	1
" marginata	...	..	1	..	..	..	..	..	1	...
" neurotic	...	..	1	..	..	..	..	..	1	...
" seborrhoeic with alopecia areata	...	..	..	..	1	..	..	..	1	...
Erythematous drug rash	...	1	..	..	..	..	..	..	...	1
Erysipelas facial	1	..	2	1	..	1	..	..	1	2
Herpes zoster	...	1	..	..	..	..	..	..	...	1
Pemphigus vulgaris	...	..	..	..	..	..	1	..	1	...
Psoriasis	4	..	..	1	..	1	..	..	6	2
Sycosis	1	..	..	..	..	..	..	..	1	...
Ulcerative mercurial stomatitis	...	..	1	..	..	..	..	..	1	...
Total	7	3	6	3	3	2	1	..	17	8
Miscellaneous Diseases.										
Hiccough	1	..	..	..	..	..	..	..	1	...
Poisons.										
Chronic arsenic poisoning	1	..	1	..	..	..	..	..	2	...
Illuminating gas	...	2	..	..	..	..	..	..	...	2
Plumbism	2	1	2	..	1	..	..	..	5	1
Total	3	3	3	..	1	..	..	..	7	3

FIRST MEDICAL DIVISION.

JANUARY, 1906—JANUARY, 1907.

ATTENDING PHYSICIANS.

JULIUS RUDISCH, M. D. N. E. BRILL, M. D.

ADJUNCT ATTENDING PHYSICIANS.

D. H. DAVISON, M. D. E. LIBMAN, M. D.

General Diseases.	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Typhoid fever	19	10	1	..	..	..	..	..	20	10
With relapse	9	5	..	..	..	..	..	..	9	5
" hemorrhage	...	1	..	..	..	..	4	2	5	2
" perforation and pelvic abscess	...	..	..	..	..	..	1	..	1	...
" post-typhoid insanity	1	1	..	1	..	..	..	..	1	2
" cardiac dilatation	1	..	..	..	..	..	..	..	1	...
" hemorrhagic nephritis	4	..	..	..	..	..	..	..	4	...
" cystitis	...	1	..	..	..	..	..	..	...	1
" pyelitis of pregnancy	...	1	..	..	..	..	..	..	...	1
" typhoid spine	...	..	1	..	..	..	..	..	1	...
Paratyphoid fever	...	1	..	..	..	..	..	..	...	1
Malarial fever—tertian	...	5	..	..	..	..	..	..	...	5
Estivo-autumnal	...	..	..	1	..	..	..	..	...	1
Cerebro-spinal meningitis	3	2	..	..	..	..	3	5	6	7
With lobar pneumonia	...	..	..	..	..	..	..	1	...	1
Tubercular meningitis	...	..	..	..	..	..	..	1	...	1
Acute general miliary tuberculosis	...	..	..	..	..	..	..	1	...	1
Influenza	6	6	..	..	..	..	..	..	6	6
Rheumatism—Acute articular	3	2	..	..	..	..	..	..	3	2
Acute articular, with endocarditis	...	..	..	2	1	..	..	..	1	2
Subacute	1	..	8	2	..	..	..	..	9	2
" with urticaria	...	..	..	1	..	..	..	..	...	1
" with chronic endocarditis	...	..	3	..	..	..	..	..	3	...
" with pes carus	...	4	..	3	..	..	..	..	...	7
Chronic	...	..	1	1	..	..	..	..	1	1
Gonorrheal arthritis	...	4	4	2	..	..	..	..	4	6
Toxic arthritis	...	..	1	..	..	..	..	..	1	...
Subacute infectious arthritis	...	..	1	2	..	..	..	..	1	2
Arthritis deformans—subacute	...	..	..	1	..	..	..	..	...	1
Chronic	...	..	2	..	..	..	..	..	2	...

General Diseases—*(Continued).*	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Diabetes mellitus	...	..	2	5	..	..	1	..	3	5
With new growth of kidney	...	..	..	..	..	1	..	..	...	1
" tertiary syphilis	...	..	..	1	..	..	..	..	...	1
Obesity	...	..	1	..	..	..	..	..	1	...
Chronic alcoholism	...	..	2	..	..	..	..	..	2	...
Chronic gout	...	..	1	1	..	..	..	..	1	1
Secondary syphilis	...	..	..	..	..	1	..	..	...	1
Measles	1	..	..	..	..	..	..	..	1	...
Cryptogenetic infection	...	2	..	..	..	..	..	..	...	2
Mediastinal tumor	...	..	..	..	2	..	..	..	2	...
Glenard's disease	...	1	..	..	..	..	..	..	...	1
Autointoxication	19	1	1	..	..	..	..	..	20	1
Post-abortive sepsis	...	..	..	..	..	..	1	...	1	
Total	67	47	29	23	3	2	9	11	109	82
Diseases of Respiratory System.										
Pleurisy—Dry	...	..	..	1	..	..	..	..	...	1
With effusion	3	3	3	1	1	..	..	..	7	4
Chronic	...	..	..	1	..	..	..	..	...	1
Chronic adhesive	...	..	1	..	..	..	..	..	1	...
Empyema	...	..	..	..	..	2	..	..	...	2
Encapsulated with abscess of lung	...	..	..	..	..	..	1	..	1	...
Pyopneumothorax	...	..	1	1	..	1	..	..	1	2
Sarcoma of pleura	...	..	..	..	1	..	..	..	1	...
Bronchitis—Acute	1	1	..	..	..	..	..	..	1	1
Chronic	...	..	..	1	..	..	..	..	...	1
" with constipation	...	1	..	..	..	..	..	..	...	1
" with myocarditis	...	..	..	1	..	..	..	..	...	1
Emphysema—Chronic	...	..	..	..	..	..	..	1	...	1
Chronic, with chronic bronchitis	2	..	8	3	1	..	3	1	14	4
Bronchial asthma	...	..	1	1	..	..	..	..	1	1
With pregnancy	...	..	..	..	..	1	..	..	...	1
Pneumonia—Lobar	6	6	..	..	..	..	4	1	10	7
With dry pleurisy	...	3	..	..	..	..	..	..	...	3
" abscess of lung	...	..	1	..	..	..	1	..	2	...
" meningococcus peritonitis	1	..	..	..	..	..	..	..	1	...
Acute broncho	3	..	..	..	..	..	1	..	4	...
" " with pericarditis	1	..	..	..	..	..	..	..	1	...
Influenza	1	..	..	..	..	..	..	..	1	...
Unresolved	...	1	1	..	..	..	..	..	1	1
Tubercular broncho	...	..	..	1	..	..	..	..	...	1
Abscess of lung	1	..	..	..	..	1	..	..	1	1
Hemoptysis	...	..	..	1	..	..	..	..	...	1
Tuberculosis—Acute miliary	...	..	..	..	..	..	..	2	...	2
Chronic miliary	...	..	..	..	..	..	1	..	1	...
Chronic miliary, with tubercular tonsillitis	...	..	..	1	..	..	..	..	...	1

	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Diseases of Respiratory System.										
(Continued).										
Tuberculosis—Pulmonary acute	...	..	1	..	..	..	..	..	1	...
" subacute	...	..	1	2	..	..	..	..	1	2
" chronic	...	..	6	10	4	3	1	1	11	14
" " with pleurisy	...	..	..	..	..	..	..	..	...	...
" " with effusion	...	..	1	1	..	..	..	..	1	1
" " with interlobar empyema	...	..	..	..	..	1	..	..	...	1
" " with tubercular laryngitis	...	..	..	..	..	1	..	..	...	1
" " with catarrhal gastritis	...	..	..	1	..	..	..	..	...	1
" " with interstitial nephritis	...	..	1	..	..	..	..	..	1	...
" " with intestinal tumor.	...	..	..	..	..	..	..	1	...	1
" " with tertiary syphilis	...	..	..	1	..	..	..	..	...	1
Mediastinal neoplasm with bronchiectasis	...	..	..	..	..	..	..	1	...	1
Total	19	15	26	28	7	10	12	8	64	61
Diseases of the Circulatory System.										
Heart.										
Myocarditis	...	..	..	..	..	..	..	1	...	1
With nephritis	...	..	2	..	..	..	2	..	4	...
Endocarditis—Acute	...	..	..	1	..	..	..	1	...	2
With streptococcemia	...	..	..	..	..	..	1	1	1	1
Chronic	...	..	6	12	..	2	2	7	8	21
" with acute exacerbation	...	..	..	1	..	..	..	3	...	4
" with myocarditis	...	..	2	..	..	..	..	..	2	...
" with pericarditis	...	..	..	..	..	..	2	..	2	...
" with chronic nephritis	...	..	7	..	..	1	2	2	9	3
" with chronic nephritis and erysipelas	...	..	..	..	..	..	..	1	...	1
" with chronic articular rheumatism	...	..	..	2	..	..	..	..	...	2
" with arterio-sclerosis and streptococcemia	...	..	..	1	..	..	..	..	...	1
" with hemiplegia and aphasia	...	..	..	1	..	..	..	..	...	1
" with chronic ependymitis	...	..	..	..	..	..	..	1	...	1
" with streptococcemia	...	..	..	..	..	..	..	1	...	1
" with aortitis	...	..	..	1	..	..	..	..	...	1
" with pregnancy	...	..	..	1	..	..	..	..	...	1
" with secondary anemia	...	..	..	1	..	..	..	..	...	1
" with splenic infarct	...	..	..	..	..	..	1	..	1	...
" with uremia	...	..	..	..	..	..	1	..	1	...
" with larva migrans	...	..	1	..	..	..	..	..	1	...
Total	...	..	18	2	..	3	11	18	29	42

	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Diseases of the Circulatory System.										
Vessels.										
Phlebitis	1	..	..	1	1	..	..	..	2	1
Endophlebitis	...	..	1	..	..	..	..	..	1	...
Endarteritis obliterans	...	..	1	..	1	..	..	..	2	...
Arterio-sclerosis	...	..	7	1	1	..	1	..	9	1
" with endarteritis	...	..	1	..	..	..	..	..	1	...
" with chronic interstitial nephritis	...	..	1	2	..	..	1	1	2	3
" with angina pectoris	...	..	1	..	..	..	..	..	1	...
" with pulmonary tuberculosis	...	..	..	1	..	..	..	..	...	1
" with senility	...	..	..	1	..	..	..	..	...	1
Aortitis, Subacute	...	..	..	1	..	..	..	..	...	1
" with dilatation of arch of aorta	...	..	..	1	..	..	..	..	...	1
Aneurism of arch of aorta	...	..	..	..	1	..	..	..	1	...
Arterio-sclerotic gangrene	...	..	..	..	..	..	1	..	1	...
Erythromelalgia	...	..	1	..	..	..	..	..	1	...
Total	1	..	13	8	4	..	3	1	21	9
Diseases of the Circulatory System.										
Blood and Hemorrhagic Diseases.										
Anemia—Pernicious	...	..	..	..	..	..	..	3	...	3
" —Secondary	...	..	2	1	..	1	..	..	2	2
" " Plumbism	1	..	..	..	..	..	..	..	1	...
" " with neurasthenia	...	..	..	1	..	..	..	..	...	1
" —Chlorosis	...	2	..	..	..	..	..	..	...	2
Spleno-myelogenous leukemia	...	..	..	1	..	..	..	..	1	...
Chronic lymphatic leukemia	...	..	1	..	..	..	..	..	1	...
Sublymphemia	...	..	..	..	..	..	1	..	1	...
Chloroma	...	..	..	..	..	..	1	..	1	...
Hodgkin's disease	...	..	1	..	..	1	..	..	2	...
Primary splenomegaly (Gaucher)	...	..	..	..	2	..	..	..	2	...
Henoch's Purpura	...	..	2	..	..	..	..	..	2	...
Tonsillitis—Acute follicular	1	..	..	..	..	..	..	..	1	...
Stricture of esophagus	...	..	1	..	..	..	..	..	1	...
Carcinoma of esophagus	...	..	..	2	..	..	..	1	...	3
Acute indigestion	1	..	..	..	..	..	..	..	1	...
Gastritis—Acute alcoholism	2	..	..	..	..	..	..	..	2	...
—Chronic	...	..	..	..	..	1	..	..	...	1
—Atrophic	...	..	..	1	..	..	..	..	...	1
" with pulmonary tuberculosis	...	..	..	..	..	1	..	..	...	1
Total	5	2	8	7	2	4	2	4	19	15

Diseases of Digestive Tract.	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Carcinoma of stomach	...	..	1	1	7	4	3	2	11	7
Pyloric stenosis	...	..	..	..	..	2	..	..	...	2
" with ulcus ventriculi	...	..	1	..	1	..	..	..	2	...
Pyloric neoplasm	...	..	..	..	..	1	..	..	...	1
Gastric neurosis	...	1	2	3	..	1	..	..	2	5
" " and neurasthenia	2	..	..	..	..	..	..	..	2	...
Gastroptosis	...	..	..	..	..	1	..	..	...	1
Gastro-enteritis	...	2	..	..	..	..	..	..	...	2
Duodenal ulcer—perforating	...	..	..	..	1	..	..	..	1	...
Entero-colitis	1	..	..	..	..	..	..	..	1	...
Colitis	1	..	..	..	..	..	..	..	1	...
" chronic	1	..	1	1	..	..	..	..	2	1
" mucus and neurasthenia	...	2	..	..	..	..	..	..	...	2
Dysentery—Subacute	...	..	1	..	..	..	..	..	1	...
" amebic	...	..	1	..	..	..	..	..	1	...
Chronic constipation	3	..	2	..	..	..	..	..	5	...
" with emphysema	...	..	..	1	..	1	..	..	...	2
Chronic intestinal obstruction (worm)	...	1	..	..	..	..	..	..	...	1
Carcinoma of intestine	...	..	..	..	..	..	1	..	1	...
Intestinal tumor	...	..	..	1	..	2	..	..	...	3
Carcinoma of transverse colon	...	..	..	..	..	..	1	..	1	...
" " sigmoid	...	..	..	..	..	..	1	..	1	...
" " rectum	...	..	..	1	..	..	..	..	...	1
Jaundice—Catarrhal	3	1	1	..	..	..	..	..	4	1
Hypertrophic cirrhosis of liver	...	..	2	..	..	..	..	..	2	...
Gumma of liver	1	..	..	..	..	..	..	..	1	...
Ptosis of liver	...	..	..	1	..	..	..	..	...	1
Cholelithiasis	1	..	..	3	..	1	..	..	1	4
Neoplasm of common bile ducts	...	..	..	..	..	1	..	..	...	1
Pancreatic tumor	...	..	..	..	1	..	..	..	1	...
Intra-abdominal new growth	...	..	..	..	..	..	1	..	1	...
Neoplasm of gall-bladder and liver	...	..	1	..	..	..	..	..	1	...
Total	13	7	13	12	10	14	7	2	43	35
Diseases of the Genito-Urinary System.										
Chronic gonorrhea	...	..	1	..	..	..	..	..	1	...
Carcinoma of prostate	...	..	..	..	1	..	..	..	1	...
Cystitis	...	1	..	..	..	..	..	..	...	1
Ureteral calculus	...	..	..	1	..	..	..	..	...	1
Pyelitis—Pyonephrosis and renal calculus	...	1	..	..	..	..	..	..	...	1
Nephritis—Acute hemorrhagic	...	..	..	..	..	..	..	2	...	2
" Subacute	...	..	1	..	..	..	..	..	1	...
" Chronic	...	..	19	10	1	..	12	2	32	12
" " with chronic endocarditis	...	..	..	2	..	..	..	1	...	3
" " with myocarditis	...	..	..	1	..	..	..	1	...	2
" " " " and emphysema	...	..	..	1	..	..	..	..	...	1

	Cured.		Improved.		Unimproved.		Died.		Total.	
Diseases of the Genito-Urinary System— *(Continued).*	M	F	M	F	M	F	M	F	M	F
Nephritis—Chronic, with pleuro-pericardial medi astinitis	...	..	..	..	..	..	..	1	...	1
" " " uremia	...	..	..	..	..	..	..	1	...	1
" " " neurasthenia	...	..	..	1	..	..	..	..	...	1
" " " senility	...	..	..	1	..	..	..	..	...	1
chronic parenchymatous	...	..	2	4	..	..	..	2	2	6
" " interstitial	...	..	3	..	..	..	..	..	3	...
" " " with arterio-sclerosis	...	..	..	1	..	..	..	1	...	2
" " " with arterio-sclerosis and uremia	...	..	..	..	..	..	..	3	...	3
" " " submaxillary adenitis	...	..	..	..	..	..	..	1	...	1
Nephrolithiasis	1	..	4	..	..	..	..	..	5	...
Pyonephrosis	...	..	3	..	1	1	..	..	4	1
" with chronic endocarditis	...	..	..	..	..	..	..	1	...	1
Nephroptosis with obstruction of ureter	...	..	..	..	..	1	..	..	...	1
" with constipation	...	..	..	1	..	..	..	..	...	1
" with neurasthenia	...	..	..	3	..	1	..	..	...	4
Perinephritic abscess	...	..	1	..	..	..	..	..	1	...
Eclampsia	...	1	..	1	..	..	..	..	...	2
Uremia	...	..	..	..	..	..	..	1	...	1
Total	1	3	34	27	3	3	12	17	50	50
Diseases of the Skin.										
Septic Pemphigus	...	..	..	1	..	..	..	..	...	1
Diseases of the Nervous System.										
Neuritis, alcoholic	...	..	..	1	..	..	..	..	...	1
" intercostal	...	..	1	..	..	..	..	..	1	...
Sciatica	7	1	2	2	..	..	..	..	9	3
Meningitis, serous	...	..	..	..	..	..	1	..	1	...
Specific pachymeningitis	...	..	1	..	..	..	..	..	1	...
Meningo-encephalitis	...	..	..	..	..	..	1	..	1	...
Cerebral embolism with chronic endocarditis.	...	..	..	..	..	..	..	1	...	1
Cerebral thrombosis	...	..	..	1	..	..	..	..	...	1
Hemiplegia	...	..	..	..	..	1	..	..	...	1
Cerebral tumor	...	..	..	..	1	..	2	..	3	...
Tabes dorsalis	...	..	..	..	1	..	..	..	1	...
Neuralgia, post auricular with chronic bronchitis and emphysema	...	..	..	1	..	..	..	..	...	1
Myalgia	...	2	..	..	..	..	..	..	...	2
" general	1	..	..	..	..	..	..	..	1	...
Pleurodynia	1	..	..	..	..	..	..	..	1	...
Painful heel	...	..	1	..	..	..	..	..	1	...
Neurasthenia	...	..	7	2	1	..	..	..	8	2
" with cholelithiasis	...	..	..	2	..	..	..	..	...	2

	Cured.		Improved.		Unimproved.		Died.		Total.	
Diseases of the Nervous System— *(Continued)*	M	F	M	F	M	F	M	F	M	F
Hiccough, neurotic	1	..	..	..	..	..	..	..	1	...
Hysteria	...	1	..	3	..	..	..	..	...	4
" acute with hemoptysis	...	..	..	1	..	..	..	..	...	1
Hysterical paramyoclonus	1	..	..	..	..	..	..	..	1	...
Chorea	...	..	..	1	..	..	..	..	...	1
Von Recklinghausen's disease	...	..	1	..	..	..	..	..	1	...
Senile dementia with arterio-sclerosis	...	..	..	..	1	..	..	..	1	...
Total	11	4	13	14	4	1	4	1	32	20
Surgical Diseases.										
Chronic suppurative otitis media—septic meningitis	...	..	..	..	..	..	..	1	...	1
Tubercular glands of neck—tumor of liver, healing fracture of humerus	...	..	..	1	..	..	..	..	...	1
Osteomyelitis of superior maxilla	...	..	..	..	1	..	..	..	1	...
Peritonsillar abscess	1	..	..	..	..	..	..	..	1	...
Submaxillary abscess with cryptogenetic toxemia	...	..	..	..	1	..	..	..	1	...
Appendicitis—Acute catarrhal	...	..	1	..	..	..	..	..	1	...
" with carcinoma of appendix	...	..	..	..	..	1	..	..	...	1
" subacute catarrhal	...	..	..	..	..	1	..	..	...	1
" chronic	...	..	..	..	..	1	..	..	...	1
" " with pregnancy	...	..	..	..	..	1	..	..	...	1
Cholecystitis, suppurative	...	..	..	..	..	1	..	..	...	1
Pericholecystitis	...	..	..	..	1	..	..	..	1	...
Pyelophlebitis—Chronic suppurative	...	..	..	..	..	..	..	1	...	1
" with multiple abscesses of liver	...	..	..	..	..	..	1	..	1	...
Carcinoma of ovary	...	..	..	..	..	2	..	..	...	2
Subphrenic abscess	...	..	..	..	..	1	..	..	...	1
Tubercular peritonitis	...	..	..	..	1	..	..	..	1	...
Retroperitoneal neoplasm	...	..	..	..	..	1	..	..	...	1
Post-operative adhesions	...	..	..	..	2	1	..	..	2	1
Arthritis of hip	...	..	1	..	..	..	..	..	1	...
" septic	...	..	..	..	..	1	..	..	...	1
" of ankle, tubercular	...	..	1	..	..	..	..	..	1	...
Multiple symmetrical lipomatosis	...	..	..	..	1	..	..	..	1	...
Strain of left side	...	1	..	..	..	..	..	..	...	1
Miscellaneous Diseases and Poisoning.										
Goitre	...	..	..	..	..	1	..	..	...	1
Pregnancy—pyelitis	...	1	..	..	..	..	..	..	...	1
" emesis	...	1	..	..	..	..	..	..	...	1
Dysmenorrhea	...	1	..	..	..	1	..	..	...	2
Machrocheilia and hysteria	...	..	..	..	..	..	..	1	...	1
Starvation	...	1	..	..	..	..	..	..	...	1
Plumbism	...	..	..	1	..	..	..	..	...	1
Total	1	5	3	2	7	13	1	3	12	23

TOTAL NUMBER OF PATIENTS IN FIRST MEDICAL DIVISION FOR YEAR 1906:

Treated	716
Cured	201
Improved	299
Unimproved	90
Died	126

STATISTICS OF THE SECOND MEDICAL SERVICE DURING 1906.

ATTENDING PHYSICIANS.

ALFRED MEYER, M.D. MORRIS MANGES, M.D.

ADJUNCT ATTENDING PHYSICIANS.

H. W. BERG, M.D. A. KOHN, M.D.

General Diseases.	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Syphilis (secondary)	2	1	3	2	..	..	..	..	5	3
Cerebro-spinal meningitis	2	..	..	..	..	..	1	3	3	3
Epidemic cerebro-spinal meningitis	1	..	..	..	..	..	..	..	1	...
Typhoid fever	12	16	..	..	..	..	3	3	15	19
With hemorrhage	2	2	..	..	..	..	..	..	2	2
" chronic nephritis	...	..	..	..	..	..	..	1	...	1
" acute parotitis and otitis media	1	..	..	..	..	..	..	..	1	...
" thrombosis of left brachial artery	...	1	..	..	..	..	..	..	...	1
" parotitis	...	1	..	..	..	..	..	..	...	1
" pneumonia	..	1	..	..	..	..	..	..	...	1
Rheumatism, acute	10	4	..	1	..	..	..	..	10	5
" subacute	10	6	1	1	..	..	..	..	11	7
" with endocarditis	3	2	3	1	..	..	..	..	6	3
" acute, pericarditis	1	..	..	..	..	..	..	..	1	...
" with peliosis	1	..	..	..	..	..	..	..	1	...
" and acute endocarditis	2	..	..	..	..	..	..	..	2	...
" with pleurisy	...	1	..	..	..	..	..	..	...	1
Arthritis (lues)	1	..	..	..	..	..	..	..	1	...
" (gonorrheal)	2	..	2	..	..	..	..	1	4	1
" (subacute infectious)	...	..	..	1	..	..	..	..	...	1
Still's disease	...	..	1	..	..	..	..	..	1	...
Chronic arthritis deformans	...	..	2	3	..	1	..	..	2	4
Septicemia (unknown cause)	...	..	..	..	..	..	1	..	...	1
General debility	...	..	..	1	..	..	..	..	...	1
Purpura hemorrhagica	...	..	..	..	..	..	..	1	...	1
Periostitis of rib	...	..	..	..	..	..	..	1	...	1
Myxedema	...	..	..	1	..	..	..	..	...	1
Diabetes mellitus	...	..	2	4	1	1	1	2	4	7
Pneumococcus meningitis	1	..	..	..	..	..	..	..	1	...
" " and pneumonia	...	..	..	..	..	..	1	..	1	...
Pachymeningitis (lues)	..	1	..	..	..	..	..	1	1	1

	Cured.		Improved.		Unimproved.		Died.		Total.	
General Diseases—*(Continued).*	M	F	M	F	M	F	M	F	M	F
Senility	..	..	..	..	..	1	..	..	..	1
Exophthalmic goitre	..	2	..	..	..	..	..	..	..	2
Lymphosarcomatosis	..	..	..	..	..	..	1	..	1	..
Paratyphoid	3	..	..	..	..	..	..	..	3	..
Lues, congenital	..	..	..	1	..	..	..	..	..	1
Lues	..	..	2	2	..	..	..	..	2	2
General carcinosis	..	..	..	..	..	..	1	..	1	..
Sunstroke	3	..	..	..	..	..	..	..	3	..
Total	58	38	16	18	1	5	9	12	84	73
Blood Diseases.										
Anemia (primary)	..	..	..	1	..	..	..	..	..	1
Hemophilia	..	..	1	..	..	..	..	..	1	..
Hodgkin's	..	..	1	..	..	..	2	1	3	1
" with erysipelas	..	..	1	..	..	..	..	..	1	..
Leukemia, aplastic	..	..	..	..	1	..	..	..	1	
" chronic lymphatic	..	..	1	..	..	..	..	..	1	..
Lymphosarcomatosis	..	..	..	..	1	..	..	..	1	..
Malaria (tertian)	4	3	1	1	..	..	..	..	5	4
Splenomegaly	..	..	..	1	..	..	..	..	..	1
Total	4	3	5	3	2	0	2	1	13	7
Contagious Diseases.										
Diphtheria (bacterial)	..	..	..	..	1	..	..	..	1	..
" (tonsillar)	..	2	..	..	..	..	..	..	..	2
Varicella	..	1	..	..	..	..	..	..	..	1
Variola	..	..	..	1	..	..	..	..	..	1
Total	0	3	0	1	1	0	0	0	1	4
Poisons.										
Nicotism, chronic	1	..	1	..	..	..	..	..	2	..
Alcoholism	..	1	..	..	..	..	..	..	..	1
Meat poisoning	..	..	1	..	..	..	..	..	1	..
Mercurial poisoning	..	..	..	..	..	1	..	1	..	2
Total	1	1	2	0	0	1	0	1	3	3
Digestive Tract.										
Gastric neurosis	1	2	1	3	..	..	..	..	2	5
Gastric ulcer	..	2	2	2	..	..	..	..	2	4

Digestive Tract—*(Continued).*	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Gastritis (acute)	..	2	1	..	..	..	..	..	1	2
" (alcoholic)	1	..	..	..	..	..	..	..	1	..
" (chronic)	..	..	..	1	..	..	..	..	..	1
" subacute, with constipation	...	1	..	..	..	..	..	..	..	1
Carcinoma ventriculi	..	..	3	5	..	..	1	1	4	6
Gastro-enteritis	1	1	..	..	..	..	..	..	1	1
Gastro-duodenitis (subacute)	2	..	..	..	..	..	..	..	2	..
Carcinoma of esophagus	..	..	1	..	1	1	1	..	3	1
Cholelithiasis	..	..	..	2	2	1	..	..	2	3
Cholecystitis	..	2	2	1	..	..	..	..	2	3
Cirrhosis hepatis	..	..	..	1	3	..	2	..	5	1
" " (cholemia)	..	..	1	..	..	..	1	..	2	..
Biliary colic	1	..	..	..	..	..	..	..	1	..
Autointoxication	21	9	..	..	..	..	..	1	21	10
Constipation	5	2	1	..	..	..	..	..	6	2
Abdominal neoplasm	..	..	..	..	3	3	..	..	3	3
Sarcoma intestines	..	..	..	..	1	..	1	1	2	1
Intestinal obstruction	2	1	..	..	..	..	..	1	2	2
Fecal impaction	1	..	..	..	..	..	..	..	1	..
Acute colitis	4	..	1	1	..	..	..	1	5	2
Catarrhal jaundice	2	1	1	1	..	..	..	..	3	2
Duodenal ulcer	..	..	1	..	..	..	..	..	1	..
Visceroptosis	..	..	1	2	1	..	..	..	1	2
Stricture of esophagus	..	..	..	..	1	..	..	..	1	..
Obstructive jaundice	..	..	..	..	1	..	1	..	2	..
General abdominal carcinoma	..	..	..	..	..	..	1	..	1	..
Carcinoma rectum with edema	..	..	..	..	..	..	..	1	..	1
Appendicitis, acute catarrhal	1	..	..	..	..	..	..	..	1	..
" " hemorrhagic	1	..	..	..	..	..	..	..	1	..
" recurrent	..	..	1	..	..	..	..	..	1	..
Pancreas, neoplasm	..	..	..	..	..	..	1	..	1	..
Peritonitis, acute general	..	..	..	..	..	..	..	1	..	1
Intestinal parasite (Tenia Solium)	1	..	..	..	..	..	..	..	1	..
Obstipation	..	1	..	..	..	..	..	..	..	1
Tumor of cecum	..	..	..	1	..	..	..	..	..	1
Peritonitis, tubercular	..	..	..	..	..	1	..	..	..	1
Retroperitoneal tumor	..	..	..	..	1	..	..	..	1	..
Colitis, acute croupous	..	..	..	..	..	..	1	..	1	..
Rectal hemorrhage	..	..	..	..	1	..	..	..	1	..
Intestinal "	..	1	..	..	..	..	..	..	..	1
Sigmoidal spasm	..	..	..	1	..	..	..	..	..	1
Neoplasm of liver	..	..	..	..	1	2	..	..	1	2
Intestinal neoplasm with uremia	..	..	..	..	..	..	1	..	1	..
Total	44	25	16	21	16	8	11	7	87	61

Respiratory Diseases.	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Nasal polypi	..	..	..	..	..	1	..	..	..	1
Emphysema	..	..	1	..	1	..	..	..	2	..
" with acute bronchitis	..	..	..	1	..	..	..	..	..	1
" " bronchitis and nephritis	..	..	..	1	..	..	..	..	..	1
" " bronchitis	2	..	4	1	..	..	..	..	6	1
" " tonsillitis	..	..	..	..	1	..	..	..	1	..
" " otitis media, mastoiditis and brain abscess	..	..	..	..	..	..	1	..	1	..
Pneumonia, lobar	14	6	..	..	..	..	2	3	16	9
" " with pericarditis	..	1	..	..	..	..	..	..	..	1
" " resolvens	..	1	..	..	..	..	..	..	..	1
" " unresolved	..	..	1	..	..	..	..	..	1	..
" " bilateral, pericarditis	..	..	..	..	..	..	..	1	..	1
" " delirium tremens	..	..	1	..	..	..	..	..	1	..
" chronic interstitial	..	..	..	..	..	..	1	..	1	..
" septic	..	..	..	..	..	..	..	1	..	1
" broncho, pericarditis	..	..	..	..	..	..	1	..	1	..
" " with myocarditis	..	..	..	..	..	..	..	1	..	1
" "	..	..	..	..	..	..	1	..	1	..
" " with Grippe	..	1	..	..	..	..	..	..	..	1
" " " hemorrhagic nephritis	..	..	..	..	..	..	..	1	..	1
" tubercular	..	..	..	..	..	..	..	1	..	1
Lung abscess	..	..	..	1	..	..	..	..	..	1
Pulmonary tuberculosis	..	..	16	9	7	1	6	3	29	13
" " with stricture of esophagus	..	..	1	..	..	..	..	..	1	..
" " " " tubercular larynx	..	..	1	..	..	..	..	1	1	1
" " " " tumor	..	..	..	..	..	1	..	..	..	1
" " " " dry pleurisy	..	..	1	..	..	..	..	..	1	..
" " " " pleurisy	..	..	..	..	..	..	..	1	..	1
" " " " neurasthenia	..	..	..	..	1	..	..	..	1	..
" " " " bronchitis	..	..	..	..	1	..	..	..	1	..
" " " " fibroid uterus	..	..	..	..	..	..	..	1	..	1
" " " " pyopneumothorax	..	..	..	..	..	..	1	..	1	..
" " " " acute miliary	..	..	..	..	..	..	..	1	..	1
" " " " hemiplegia	..	..	..	..	..	..	1	..	1	..
" " " " pneumothorax	..	..	1	..	..	..	1	..	2	..
" " " " tubercular coxitis	..	..	..	..	..	..	1	..	1	..
" " " " meningitis	..	..	..	..	..	..	2	..	2	..
Bronchitis with influenza	3	4	..	..	..	..	..	..	3	4
" acute	3	4	..	..	..	..	..	..	3	4
Lung tumor	..	..	1	..	..	..	..	..	1	..
" syphilis	..	..	1	..	..	..	..	..	1	..
Pneumothorax	1	..	..	..	..	..	..	..	1	..
Frontal sinusitis	..	..	1	..	..	..	..	..	1	..
Laryngitis, acute with pharyngitis	..	1	..	..	..	..	..	..	..	1
" " " tonsillitis	2	..	..	..	..	..	..	..	2	..

	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Respiratory Diseases—*(Continued).*										
Nasal polyp with pharyngitis	..	..	1	..	..	..	..	..	1	..
Pleurisy, dry	..	1	1	1	..	..	..	..	1	2
" with effusion	2	4	..	..	..	..	..	..	2	4
" " " and air	..	..	..	1	..	..	..	..	..	1
Hydropneumothorax	1	..	..	..	..	..	..	..	1	..
Mediastinal tumor	..	..	..	..	1	..	..	..	1	..
Total	28	23	32	15	12	3	18	15	90	56
Circulatory Diseases.										
Chronic endocarditis	..	..	23	24	..	..	5	10	28	34
Chronic endocarditis	..	..	23	24	..	..	5	10	28	34
" " with subacute rheumatism	..	..	6	..	1	..	..	1	7	1
" " vegetative " "	..	..	..	1	..	..	..	..	..	1
" " with chronic "	..	..	3	1	..	..	..	..	3	1
Acute endocarditis with chronic rheumatism	..	..	1	2	..	..	..	..	1	2
Malignant endocarditis	..	..	..	..	..	..	2	1	2	1
Chronic endocarditis with hemiplegia	..	..	1	..	..	..	..	..	1	..
" " " nephritis	..	..	..	..	1	..	..	..	1	..
" " " facial erysipelas	..	..	1	..	..	..	..	..	1	..
" " " myocarditis	..	..	2	..	..	..	..	..	2	..
" " " " and nephritis	..	..	1	..	..	..	..	..	1	..
" " " lung infarct	..	..	..	..	..	..	1	..	1	..
" " " spleen infarct	..	..	1	..	..	..	..	..	1	..
" " " rheumatism and pleurisy	..	..	..	..	1	..	..	..	1	..
" " " autointoxication	..	..	..	..	1	..	..	..	1	..
" " " monarthritis	..	..	1	..	..	..	..	..	1	..
" " " edema of lungs	..	..	..	..	..	..	1	..	1	..
" " " acute dilatation	..	..	..	..	..	..	1	..	1	..
" " " " exacerbation	..	..	..	..	..	..	1	..	1	..
" " " arterio-sclerosis	..	..	..	..	1	..	..	..	1	..
" " " goitre and diabetes	..	..	..	..	1	..	..	..	1	..
" " " effusion into chest	..	..	..	..	..	..	..	1	..	1
" " " fatty degeneration and obesity	..	..	..	..	1	..	..	..	1	..
Total	..	..	40	28	7	..	11	13	58	41
Vessels.										
Endarteritis (apoplexy)	..	..	..	..	..	..	..	1	..	1
Arterio-sclerosis	..	..	4	..	3	..	1	..	8	..
" with erythromelalgia	..	..	1	..	..	..	..	..	1	..
Raynaud's disease	..	..	2	..	..	..	..	..	2	..

	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Saphenous thrombus (bilateral)	..	..	1	..	..	..	..	..	1	..
Chronic aortitis (contusion of ribs)	..	..	1	..	..	..	..	..	1	..
Erythromelalgia	..	..	1	..	1	..	..	..	2	..
Basedow's disease	..	..	1	..	..	..	..	..	1	..
" " with nephritis	..	..	..	1	..	..	..	..	..	1
Aortic aneurism	..	..	1	..	..	..	..	..	1	..
Multiple thrombo-phlebitis	..	..	..	1	..	..	..	..	..	1
Hemorrhagic diathesis, with visceral manifestation	..	..	1	..	..	..	..	..	1	..
Total	..	..	13	2	4	0	1	1	18	3
Surgical Cases.										
Tuberculosis, hip joint	..	..	..	..	1	..	..	..	1	..
Tubercular coxitis	..	..	..	1	..	..	..	..	..	1
Tubercular ostitis (gangrene of leg)	..	..	1	..	..	..	..	..	1	..
Double inguinal hernia	..	..	..	..	1	..	..	..	1	..
Subphrenic abscess	..	..	1	..	..	..	..	..	1	..
Chronic appendicitis	..	1	..	..	..	..	..	..	..	1
Pes planus	..	..	..	2	..	..	..	..	..	2
Fracture, nasal bone	1	..	..	..	..	..	..	..	1	..
Hemorrhoids	..	1	..	..	..	..	..	..	..	1
Typhoid cholecystitis	..	1	..	..	..	..	..	..	..	1
Infectious arthritis	..	1	..	..	..	..	..	..	..	1
Traumatic periarthritis	1	..	..	..	..	..	..	..	1	..
Subdeltoid bursitis	..	1	..	..	..	..	..	..	..	1
Inguinal adenitis	..	..	1	..	..	..	..	..	1	..
Ischio-rectal abscess	..	..	..	..	1	..	..	..	1	..
Chronic myositis	..	1	..	..	..	..	..	..	..	1
Burn	1	..	..	..	..	..	..	..	1	..
X-ray burn of abdomen	..	..	..	1	..	..	..	..	..	1
Ulcer of leg	1	..	..	1	..	..	..	..	1	1
Ulcer of lip	1	..	..	..	..	..	..	..	1	..
Furunculosis	1	..	..	..	..	..	..	..	1	..
Total	6	6	3	5	3	0	0	0	12	11
Genito-Urinary Diseases.										
Chronic nephritis	1	..	11	15	2	..	4	2	18	17
With uremia	...	..	..	..	1	..	1	2	2	2

	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Genito-Urinary Diseases.—*(Continued).*										
" uremia and pericarditis	..	..	..	..	..	..	1	..	1	..
" uremia and endocarditis	..	..	..	4	2	1	..	..	2	5
" arterio-sclerosis	..	..	2	1	..	..	1	..	3	1
" tuberculosis	..	..	..	1	..	..	..	..	..	1
" renal asthenia	..	..	..	1	..	..	..	..	..	1
" otitis media	..	..	1	..	..	..	..	..	1	..
" exacerbation	..	..	4	..	..	..	..	..	4	..
" exudative	..	..	..	..	1	..	..	..	1	..
" hydrothorax	..	..	..	1	..	..	..	..	..	1
Hemorrhagic nephritis	..	1	1	..	..	..	..	..	1	1
Chronic nephritis with emphysema	..	..	1	..	..	..	..	..	1	..
Acute uremia	..	1	..	..	..	..	1	1	1	2
" with pregnancy	..	1	..	..	..	..	..	..	..	1
Chronic nephritis with pregnancy	..	1	..	..	..	..	..	..	..	1
" " " " and hydrothorax	..	..	..	..	..	1	..	..	..	1
Subacute nephritis	1	..	..	1	1	..	..	..	2	1
Acute exudative nephritis	..	..	..	1	..	..	..	..	..	1
Renal colic	2	..	..	..	..	..	..	..	2	..
Pelvic tumor	..	..	..	..	..	1	..	..	..	1
Nephroptosis	..	..	..	1	..	..	..	..	..	1
Atrophic ovaries	..	..	..	..	..	1	..	..	..	1
Puerperal streptococcemia	..	..	..	..	..	..	..	1	..	1
Pelvic abscess	..	..	..	2	..	..	..	..	..	2
Vomiting of pregnancy	..	..	..	1	..	1	..	..	..	2
Neurasthenia of pregnancy	..	..	..	1	..	..	..	..	..	1
Subinvolution of uterus	..	..	..	1	..	..	..	..	..	1
Sloughing fibroid	..	..	..	..	..	1	..	..	..	1
Perirectal exudate	..	1	..	..	..	..	..	..	..	1
Dysmenorrhea	..	..	..	..	..	1	..	..	..	1
Chronic cystitis	1	..	1	..	..	1	..	..	2	1
Ascending pyelitis	..	1	..	..	..	..	..	..	..	1
Pyelitis of pregnancy	..	..	..	1	..	..	..	1	..	2
Pyelitis with premature labor	..	1	..	..	..	..	..	..	..	1
Renal calculus	..	1	..	..	..	..	..	..	..	1
Epididymitis	1	..	..	..	..	..	..	..	1	..
Total	6	8	21	32	7	8	8	7	42	55

TOTAL NUMBER OF PATIENTS IN SECOND MEDICAL DIVISION FOR YEAR 1906:

Treated 722

Cured	254
Improved	273
Unimproved	78
Died	117

ON THE QUANTITATIVE DETERMINATION OF THE PURIN BODIES IN URINE.

J. Rudisch, M. D.
ATTENDING PHYSICIAN.

In Volume IV. of the Mt. Sinai Hospital Reports, 1903-1904, in an article describing a method for the determination of uric acid and xanthin bodies founded on experiments made by Dr. Kleeberg and myself, and published in the *American Journal of Medical Sciences,* November 1904, I expressed the hope that I might be able to overcome the difficulties sometimes encountered in determining the exact end point of the reaction in this method. A long series of experiments was made, and the results have fully come up to my expectations. As I pointed out at that time, the determination of chloride of silver by acetic acid, peroxide of hydrogen and starch is not satisfactory in the presence of organic substances, as some of the liberated iodine is taken up by these substances in such a combination that acetic acid and hydrogen peroxide cannot break it up.

To obviate this difficulty I proceed as follows: Equal parts of the urine and of a weak solution of N/50 silver chloride, if both uric acid and xanthin bodies are to be determined, of a strong ammoniacal solution of N/50 silver chloride for the determination of uric acid alone, are mixed and filtered. An aliquot part of the filtrate is strongly acidified with pure concentrated nitric acid, brought to a boil and filtered. On the filter remains only a precipitate of pure chloride of silver. The filter is put in an Erlenmeyer flask and thoroughly shaken with a small quantity of water until the paper is broken up and freed from the precipitate. The nitric acid is now overneutralized with a weak solution of ammonia, and acetic acid in excess, hydrogen peroxide and starch added. (I find

that the addition of a little persulphate of sodium while not essential, aids materially in bringing out the end reaction.)*

Titration now proceeds with an N/50 solution of potassium iodide until a strong blue color develops: To determine the end reaction accurately it is then necessary to titrate back with an N/50 solution of silver until the blue color just disappears. The delicacy of this end reaction is shown by the fact that at this point the addition of 1/10 cc. of the potassium iodide solution will again bring out the blue iodine-starch reaction very strongly.

As in all color reactions a prerequisite for the recognition of the disappearance or reappearance of the blue coloration is repeated trial practice with measured amounts of the reagents. The following quantities will be found convenient for this purpose. Into an Erlenmeyer flask containing about 100 cc. of water put 15 cc. of the N/50 silver solution accurately measured, then add glacial acetic acid about 15 cc., hydrogen peroxide about 15 cc., (the ordinary 2 per cent. solution as dispensed in drug stores is sufficient), somewhat less than 1 gm. persulphate of soda and a few drops of starch water. An N/50 solution of potassium iodide is now run into the liquid until a strong blue color appears. Titrate back with the N/50 silver solution until the blue color just disappears, then retitrate with the potassium iodide solution until a faint blue color is just apparent. It is advisable to repeat these titrations back and forth until the eye becomes thoroughly accustomed to these changes of color.

*The reason the nitric acid is overneutralized by ammonia is that the presence of free nitric acid interferes with the test.

A RAPID COLORIMETRIC METHOD FOR THE QUANTITATIVE DETERMINATION OF IRON IN ORGANIC FLUIDS, ESPECIALLY URINE.

By J. Rudisch, M.D., and S. Bookman, M.A., Ph.D.

The method is as follows: 25 to 100 c.c. of urine (depending upon the amount passed in 24 hours) are placed in a 500 c.c. Erlenmeyer flask, acidified with 5 c.c. concentrated sulphuric acid, and boiled over a Bunsen flame. Twenty-five c.c. of a 5 per cent. solution of potassium permanganate are then carefully added, a few c.c. at a time, the liquid being allowed to boil briskly after each successive addition. Small quantities (about 1 c.c.) of a solution of hydrogen peroxide are now added to the briskly boiling solution until it is just decolorized. The decolorized liquid is now concentrated down to about 10 c.c., allowed to cool, and poured into a 50 c.c. graduated cylinder. There are then added to the fluid in the cylinder two c.c. of a five-normal hydrocloric acid (containing 182.5 gm. HCl. per liter), distilled water up to 15 c.c., 10 c.c. normal ammonium sulphocyanate and acetone* up to 50 c.c. The mixture is now poured back into the original flask, and thoroughly mixed. In the presence of iron a pink coloration. due to the formation of ferric thiocyanate, results.

This solution is filled into one tube of a Du Bosc colorimeter. In the comparison tube is put the following solution: two c.c. of a solution of ferric chloride (prepared from pure iron wire, and containing 0.01 mgm. Fe per c.c.), two c.c. of a five-normal hydrochloric acid, 11 c.c. distilled water, 10 c.c. normal ammonium sulphocyanate, and 25 c.c. acetone. These various reagents must also be thoroughly mixed. The scale of the comparison tube is then fixed at a point

*The use of acetone to sharpen and make more permanent the end reaction was first suggested by Marriot and Wolf (Jour. of Biol. Chem., 1905, p. 451).

where a distinct color is obtained (i.e., about 20), and the first tube compared with this as a standard. From the formula

$$\frac{20}{x}.0.02.\frac{n}{m}.$$

may then be calculated the number of milligrams of iron in the 24-hour specimen of urine. In this formula:

x=reading of scale of colorimeter of liquid to be examined.
n=total quantity of urine per 24 hours.
m=number of c.c. of urine employed for iron determination.
20=reading of scale of standard solution.
0.02=mgm. of iron in standard solution.

For the determination of iron in blood, a measured quantity of blood is placed in an Erlenmeyer flask, and to it are added 25 c.c. of distilled water. The subsequent procedure is identical with that already described for urine. As small an amount as 0.25-0.5 c.c. of blood may be employed for an iron determination.

For stools or tissue, the material is incinerated in a platinum dish, covered with hydrochloric acid, and then transferred to an Erlenmeyer flask. From this point onward, the same method is employed.

In the presence of large amounts of iron an aliquot part of the substance to be examined should be employed. It is advisable to test the reagents—hydrochloric acid, ammonium sulphocyanate, acetone for their iron contents by making up a test solution in the proportions employed in the original method described above. Any coloration resulting is determined by comparing the same with a solution of ferric chloride, made up to the same tint. The correction thus determined is added to the scale of the standard solution. For example, if a correction of 0.5 is found, the scale of the standard of 20 will be set at 20.5, while from the reading on the other scale 0.5 will be deducted. The formula given above will still apply.

These determinations can be readily completed within an hour. The method is therefore very convenient for the study of metabolic changes in which iron plays an important part.

QUANTITATIVE IRON DETERMINATION

IN A CASE OF

PAROXYSMAL HAEMAGLOBINURIA

BY THE METHOD OF RUDISCH AND BOOKMAN

ABCISSA = Milligrammes Fe in 24 hours. Each horizontal division corresponding to 24 hours

ON SIX CASES OF MALIGNANT ENDOCARDITIS.

By Alfred Meyer, M. D.,
ATTENDING PHYSICIAN.

In making a study of the following six cases of malignant endocarditis I have had a considerable hesitancy as to how to designate them. In spite of a few interesting differences which will be commented upon later, there are clinically many points of resemblance and they belong to a class of cases which for many years has been designated as ulcerative endocarditis. My first intention was to call them all malignant *bacterial* endocarditis. Firstly, because they were malignant in their course and ended fatally, with septic symptoms more or less acute and pronounced; secondly, because I believe the evidence is strong that they were all of bacterial origin, yet bacteria were present in the blood cultures of only three of them. In two the blood cultures were negative and in one, unfortunately, no blood culture was made, and no post mortems were obtained in the cases with negative findings. Five of these cases occurred on my own service. The case E. B. I had seen privately in consultation and am publishing through the courtesy of Dr. Brill, into whose service she was subsequently admitted.

Case I.—*Streptococcus endocarditis, embolic aneurism of ulnar artery.* H. E., male, seventeen years old, single, school boy. Admitted April 11, 1906. Died July 2, 1906.

Etiology.—Has suffered from cardiac palpitation since his second year. Has also had an ear discharge of many years duration.

Present Illness.—Sudden onset eighteen hours before admission with loss of power in his left arm, inability to walk, loss of speech during half an hour. No loss of consciousness. Does not know whether he has had any fever, but sweats profusely.

Physical examination shows:

1. Facial paralysis on left side.

2, Left sided paresis.

3*a*, A loud, rough, blowing, systolic murmur at apex transmitted all over the precordium and to axilla.

b, Systolic and diastolic murmur in aortic area, the systolic murmur transmitted into vessels of the neck.

c, Systolic murmur in pulmonic area.

d, Thrill at apex.

4, Pulse Corrigan in type; capillary pulse present and Duroziez murmur present.

5, Spleen palpable two fingers below free border.

6, Liver palpable two fingers below free border, slightly tender.

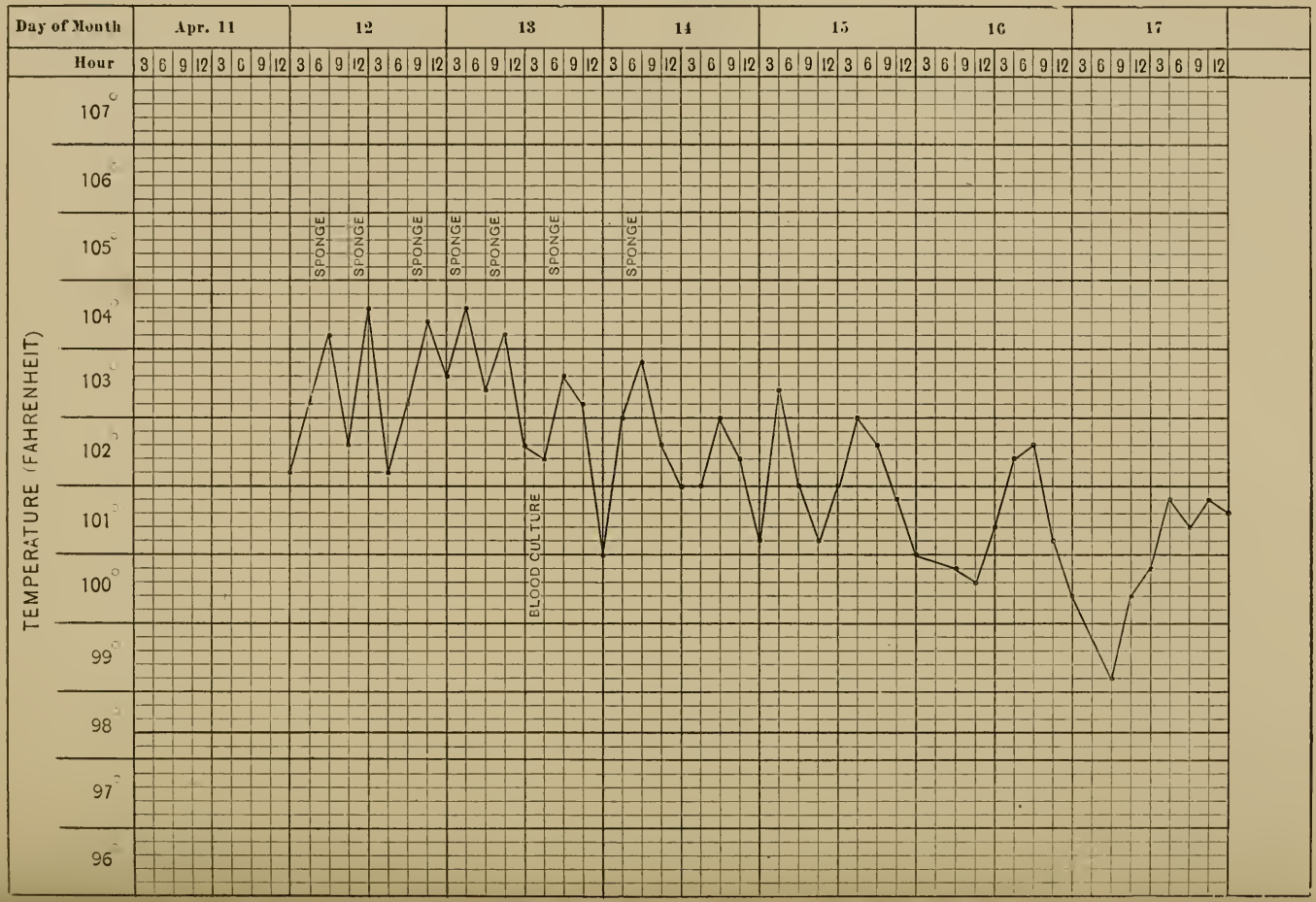
7, Marked cyanosis and clubbing of fingers and toes with incurvation of nails.

8, No petechiæ.

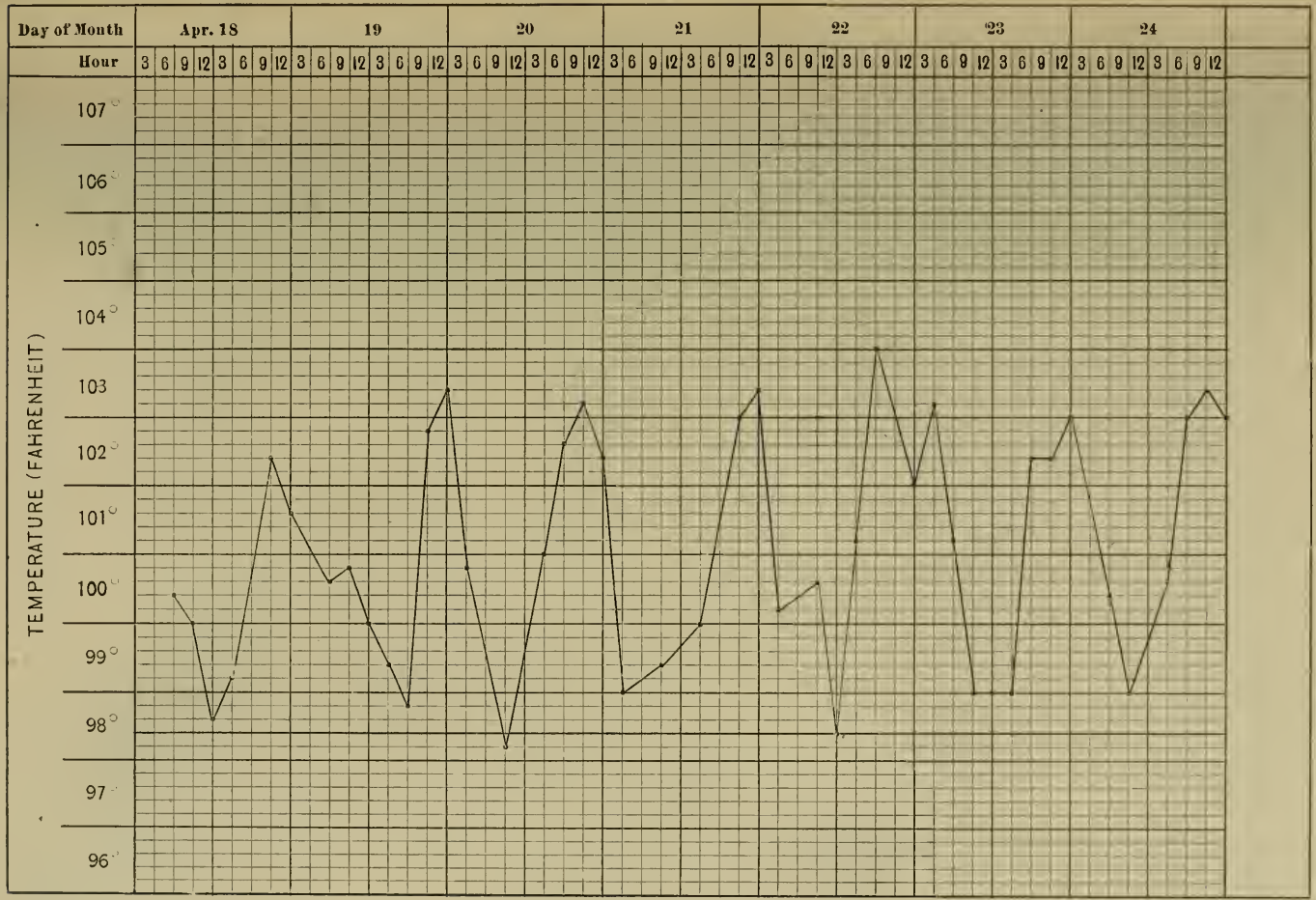
Fever on day of admission ranged between 102 and 104.6, pulse between 100 and 132, respiration between 24 and 30. The urine contained a trace of albumin. On May 3, a fusiform swelling was first observed over upper part of left fore arm with expansile pulsation and in which a systolic diastolic murmur could be heard. On May 6, this swelling was the size of a robin's egg. On May 7 and 8, petechial eruption was observed for the first time on right lower lid, on the floor of the mouth and in the right conjunctival sac. The first blood culture was taken on April 13, amounting to 10 cc. and streptococcus mucosus capsulatus grown in three days. Subsequent cultures on April 24, 13 cc.; May 15, 10 cc.; June 3, 7 cc., all showed no growth, but the urine of April 26 showed streptococci. The temperature chart of the first two weeks is shown on pages 43 and 44.

From the third week and subsequently to the end, the temperature was mostly under 102. There was progressive anemia with 40% Hgb. on admission, which gradually fell to 28. The leucocyte count varied between 11,300 and 26,500, with the polynuclears about 55%. The amount of the albumin in the urine gradually increased and there were varying numbers of red blood cells and casts.

Autopsy.—Lungs: Brown induration, emphysematous. Heart: Right auricle and ventricle enlarged; left ventricle hypertrophied and dilated; old aortic insufficiency with recent friable vegetation on the center of flaps and extending down over entire surface of anterior flap of the mitral valve and chordæ tendineæ. Mitral shows moderate old thickening. Coronaries negative. Heart muscle cloudy. Slight changes at arch of aorta. Spleen: Enlarged and soft; a few old yellow infarcts. Liver: Enlarged congested, fatty. Adrenals,



TEMPERATURE CHART H. E.



TEMPERATURE CHART H. E.

Pancreas, Mesentery negative. Kidneys: Enlarged, capsules slightly adherent, few yellow infarcts. Left Ulnar Artery: About six cm. from its origin there is an aneurism (about size of a cherry) of the ulnar artery containing dark red clot. Bacteriological of Heart Blood: bac. muc. capsulatus and coli. No streptococci found.

Case II.—*Tricuspid stenosis, mitral stenosis, aortic insufficiency, acute (pneumococcus) endocarditis, chronic nephritis, bladder hemorrhage.* E. B., female, twenty-one years old, single, stenographer. Admitted April 8, 1904. Died April 27, 1904.

Had measles and mumps as a child. No other exanthemata or acute trouble of any kind. No cardiac, pulmonary, nephritic, nervous or gastro-intestinal symptoms. Was told, however, that she had had heart trouble when a child. Menstrual history negative.

Present Illness.—Six weeks before admission patient claims to have "caught cold," was sick for five days and then went to work. A week later she had a chill, followed by headache and fever and has been in bed most of the time since then, with recurrent chills, slight cough, occasional dyspnea and cardiac palpitation, edema of the feet and precordial and abdominal pains. No epistaxis or hemoptysis. Has vomited several times in the course of the week. There are three or more loose movements per day. There is headache and anorexia. There was a chill last night, another one this morning followed by high fever and profuse perspiration.

Physical Examination.—General condition rather poor, complexion pasty.

Eyes.—Petechiæ in both upper eyelids and right lower lid.

Thyroid.—Isthmus palpable.

Glands.—General slight enlargement except the epitrochlears.

Lungs.—Negative.

Heart.—Upper border at 3d space, left border 14 cm. from median line at fifth space. Right border 4½ cm. from median line; apex beat 8½ cm. to left of median line; faint thrill palpable; action regular, forcible and normal in frequency.

Murmurs.—Prolonged, rough presystolic murmur at apex followed by accentuated first sound and blowing systolic murmur with faint second sound. The systolic murmur is transmitted into left axilla. The presystolic is well localized; second pulmonic is accentuated. Both sounds at the aortic orifice are muffled.

Pulses.—Equal, small, compressible, no capillary pulse.

Liver.—Not palpable.

Spleen.—Just palpable, fairly firm.

Abdomen.—Negative, save for palpable and somewhat tender right kidney.

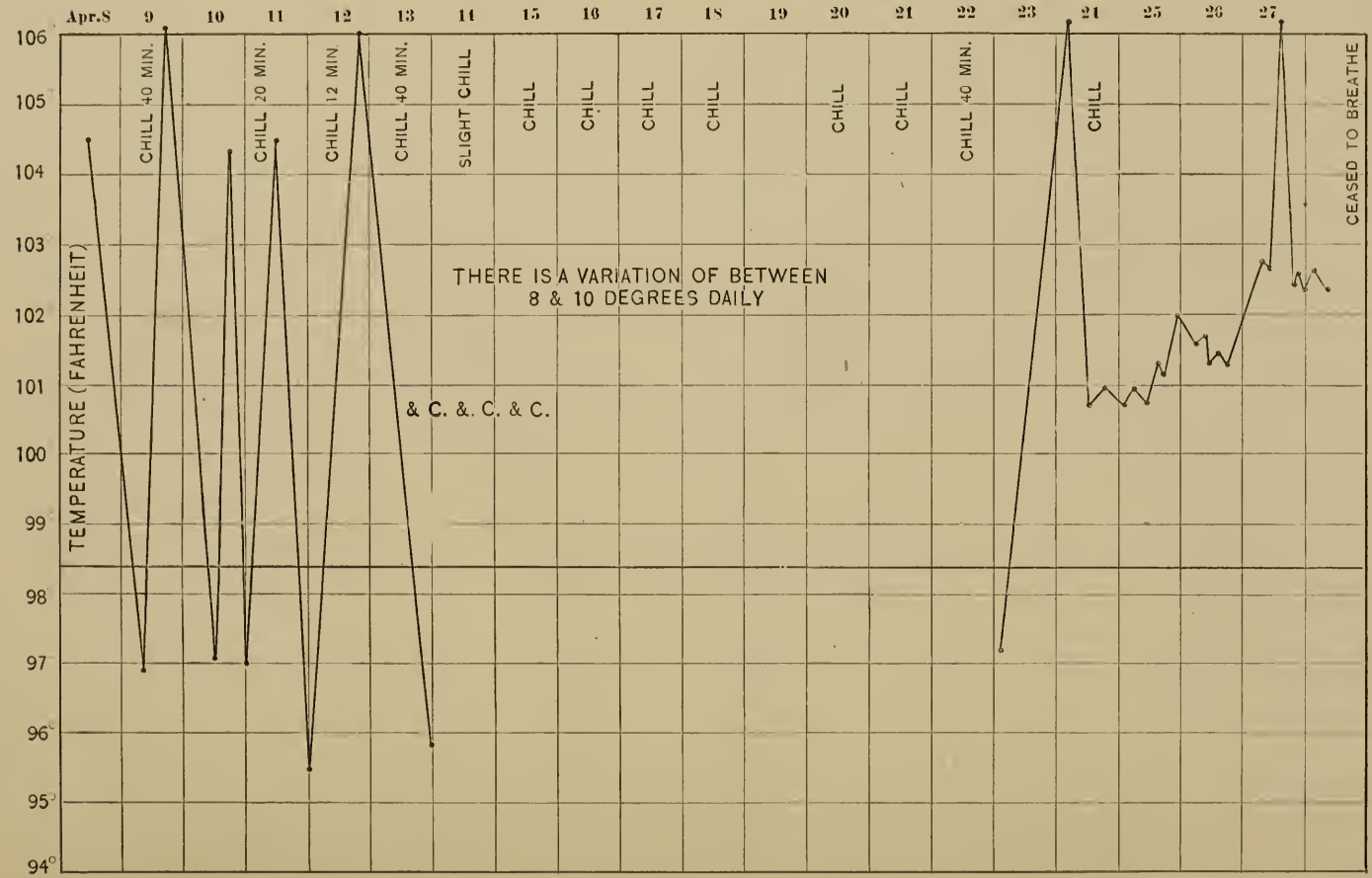
Extremities.—No edema.

Fever on the first day ranged between 96.9 and 104.5. Subsequently, with few exceptions, she had daily chills. The temperature range being between 7 and 10 degrees, on one occasion nearly 11 degrees (95.2-106°).

Temperature chart, E. B., see page 47.

The pulse rate varied until the time of her death between 80 and 120, occasionally 70. The last week of her life 40 to 50 (cerebral embolism). Respirations were mostly between 22 and 30. During her last week between 45 and 50. Fresh crops of petechiæ appeared from time to time on both eyelids, on palm of right hand, both lips, and fingers of left hand. Two days before death, they appeared over body including thighs, legs and dorsum of feet. Three days before death, hemorrhages in both fundi. On April 13, the blood culture showed the pneumococcus, 220 colonies to the c.c. The leucocyte count varied between 11,000 and 21,000. The auscultatory evidence in the heart showed no changes in the sounds and murmurs with the exception of the development of a slight diastolic murmur over the aortic orifice. On April 13, five days after admission, patient did not respond to questions, and it was found that she had aphasia and complete right sided hemiplegia and facial paralysis. She was wholly unconscious between April 21 and April 23d with but slight improvement before the final coma and her death. The urine which in the beginning had only traces of albumin, subsequently showed considerable amounts with occasional hyaline casts and some red blood cells.

Autopsy.—Pleura, some adhesions. Lungs: Right lower lobe congested; upper lobe emphysematous, edematous; middle lobe, emphysema; left lung, brown induration. Heart: Weight 465 gms., right auricle dilated, tricuspid flaps show old and recent vegetation; left auricle dilated, sclerotic and calcareous patches. Aortic orifice shows marked insufficiency. Mitral flaps shortened; yellow red vegetations in flaps. A few yellow red vegetations on auricular surface of valve. Left ventricle evidences of old dilatation. Heart muscles soft, cloudy, interstitial myocarditis. Aortic flaps marked thickening and some calcareous deposit. Spleen: Chron. interst. splenitis, anemic infarcts. Kidneys: A few petechiæ on surface. Markings poor. Few small anemic infarcts. Some petechiæ in pelves. Aorta: Fatty degeneration. Just above bifurcation and extending up one-half cm. and into each of iliacs a firm, granular, thrombus, gray throughout, slightly adherent. Liver: Recent perihepatitis over both lobes, nutmeg. Intestines: Small hemorrhages in wall. Bladder: Hemorrhagic areas. Ovaries: Negative, right tube petechiæ. Bacteriological of spleen: B. coli, staphyl. aureus, pneumococcus.



TEMPERATURE CHART E. B

Case III. *Mitral stenosis and insufficiency, aortic stenosis and insufficiency. Streptococcus endocarditis.* E. D., male, twenty years old, single, tailor. Admitted March 24, 1906. Died July 31, 1906.

Had measles as a child. Has had a chronic cough without expectoration. No acute illness of any kind, except some slight sore throat.

Present Illness.—Of two weeks duration prior to admission. Sore throat, night sweats, cough, edema of the face and weakness.

Physical Examination.—General condition poor, marked pallor.

Heart.—A presystolic-systolic thrill at apex. A slight diastolic impulse is felt at third left intercostal space. A presystolic, systolic diastolic murmur at the apex. At the base a loud systolic diastolic murmur. In vessels of the neck a blowing systolic murmur.

Spleen.—Just palpable below the free border of the ribs.

Liver.—Not palpable.

Abdomen.—Fluid wave present.

Glands.—General slight enlargement.

Temperatures during the first week were nearly normal. Subsequently they were of a septic type fluctuating mostly between 98 and 102, but mostly with a range of six degrees (98-104) in the 8th, 11th, 13th and 16th weeks.

The pulse rate varied between 90 and 130 and the respiration between 24 and 40. The first blood culture was made on April 19. Twelve c.c. were taken and showed streptococci in 72 hours. Petechiæ appeared on April 20 in left lower conjunctival sulcus. Subsequent cultures on May 15th (11 c.c.) and June 13 (1.5 c.c.) were negative. Fresh petechiæ in the lower lid were seen on April 27th, May 17th, 24th, 29th, June 17th and June 22d. They were not observed on any other part of the body. On June 26th, after the patient had been out of bed for three days walking about, a profuse hemorrhagic eruption appeared on both legs extending in a day or two above the knee. The spots were the size of a pea and dark in color. July 2d, fresh petechiæ in left lower lid and on left upper jaw and behind last molar. July 4 and 5, new spots on conjunctivæ, also on July 11th and on the legs July 20th and 26th. Hgb. 60% on admission, afterwards 45%. Highest leucocyte count 7,400. The endocardial murmurs underwent no change during the course of the disease. Liver and spleen both increased in size in the course of a few months. On July 19, the liver was palpable 7.5 cm. below free border in mammary line. On April 23, the edge of the spleen could be felt at the crest of the ilium. On July 2d, it was palpable in the anterior axillary line 9.5 cm. below the free border. No crepitations audible over it. On April 7, both kidneys were palpable. Red blood cells were found in the urine from time to time, although guaiac reaction was negative throughout. Albumin was only present in faint traces, also an occasional hyalo-granular cast. No autopsy.

CASE IV.—*Aortic stenosis and mitral insufficiency.* A. S., male, twenty-three years old, single, tailor. Admitted June 9, 1906. Died July 16, 1906. At age of 15 years had an attack of chorea following trauma on back, and repeated attacks of sub-acute articular rheumatism followed by cardiac disease. Then there succeeded palpitation, shortness of breath and edema of legs. Each winter he would have an attack of fever with temperatures of 100 to 102° and an exacerbation of these symptoms, occasional attacks of rheumatic pains with swelling and impairment of functions in joints of hands, feet, ankles, knees, elbows and shoulders.

Present Illness.—Of seven weeks duration with an increase of the above symptoms associated with a reduction in the amount of urine, ascites, edema of legs and face, tenderness in right hypochondrium.

Physical Examination.—On admission there were no joint symptoms nor did any develop subsequently.

Heart.—The heart was enlarged to the right and left; apex beat 12.5 cm. from median line. There was a loud rough systolic murmur at apex transmitted to the left axilla. Pulmonic second markedly accentuated. Aortic second accentuated, a systolic blow in aortic area.

Liver.—Pulsating and enlarged.

Spleen.—Enlarged, no clinical evidence of infarcts.

Temperature on admission 100 plus, afterwards varying between 97 and 102.

Pulse on admission was 90, respiration 38. Pulse afterwards varied between 80 and 90, excepting for a short time, when it dropped to 36 after the use of digitalone (mx. q.4.h.). The slow pulse rate was in part due to imperfect systole, so that at times the apical impulse would be 112 and the radial pulse 90. Respirations ranged mostly from 26 to 28. Petechiæ first appeared on June 26th, seventeen days after admission. A blood culture taken on the following day (14 c.c.) proved negative. Second crop of petechiæ appeared two weeks later on the hard palate, abdomen, and retina (the first crop having appeared on back, thighs and elbow). In neither crop were the eyelids involved. On admission the Hgb. was 72% and the leucocyte count 13,400. The highest leucocyte count was 18,600, one day after the appearance of petechiæ. At no time did the urine contain any red blood cells.

CASE V.—*Mitral stenosis and insufficiency.* M. H., male, twenty-eight years old, single, tailor. Admitted Dec. 31, 1905. Died Feb. 7, 1906. Had measles, scarlet fever and smallpox in childhood, cardiac symptoms some years before admission, dyspnea, muscular pains, edema of legs one year before admission. First chill six months before admission.

Present Illness.—Probably dates from first chill six months ago. Complains of pain in his joints, took to bed six weeks ago.

Physical Examination.—Marked pallor, fairly well nourished, slight general enlargement of glands.

Heart.—Apex beat forcible, diffuse and heaving in fourth and fifth spaces. Right and left ventricle both enlarged. Thrill felt over entire precordium.

Murmurs.—Presystolic-systolic murmur at apex, second pulmonary accentuated.

Veins.—Pulsation visible in the neck.

Liver.—Enlarged and tender.

Spleen.—Hard and large.

Extremities.—Slight clubbing of fingers.

Temperate was normal for the first week. In the second and third weeks normal with single sudden rises to 101 and 102. In fourth and fifth week, nearly normal, interrupted by a single chill in each week and followed by a rise to 104.8 and 103.8 respectively.

Temperature chart, M. H., see pages 51, 52 and 53.

No acceleration of pulse or respiration during whole disease. Jan. 13, pain in right knee, which is hot and red, ankle also painful. Feb. 2, petechiæ in palpebral conjunctiva and skin. Few small hemorrhages in right fundus. Blood culture Feb. 3, 5 c.c. negative. Feb. 3 and 4, pain and tenderness over spleen with friction sound. Urine always contained albumin and casts. Red blood cells not always present, but showing a tendency to reappear after chills. The Hgb. varied from 60 to 35%. White blood cells 7,500 to 7,800. Sudden death preceded by bradycardia (48) with severe precordial pain not previously noted except once before during a chill. These agonal symptoms lasted about four hours. (Embolism of the coronary artery?)

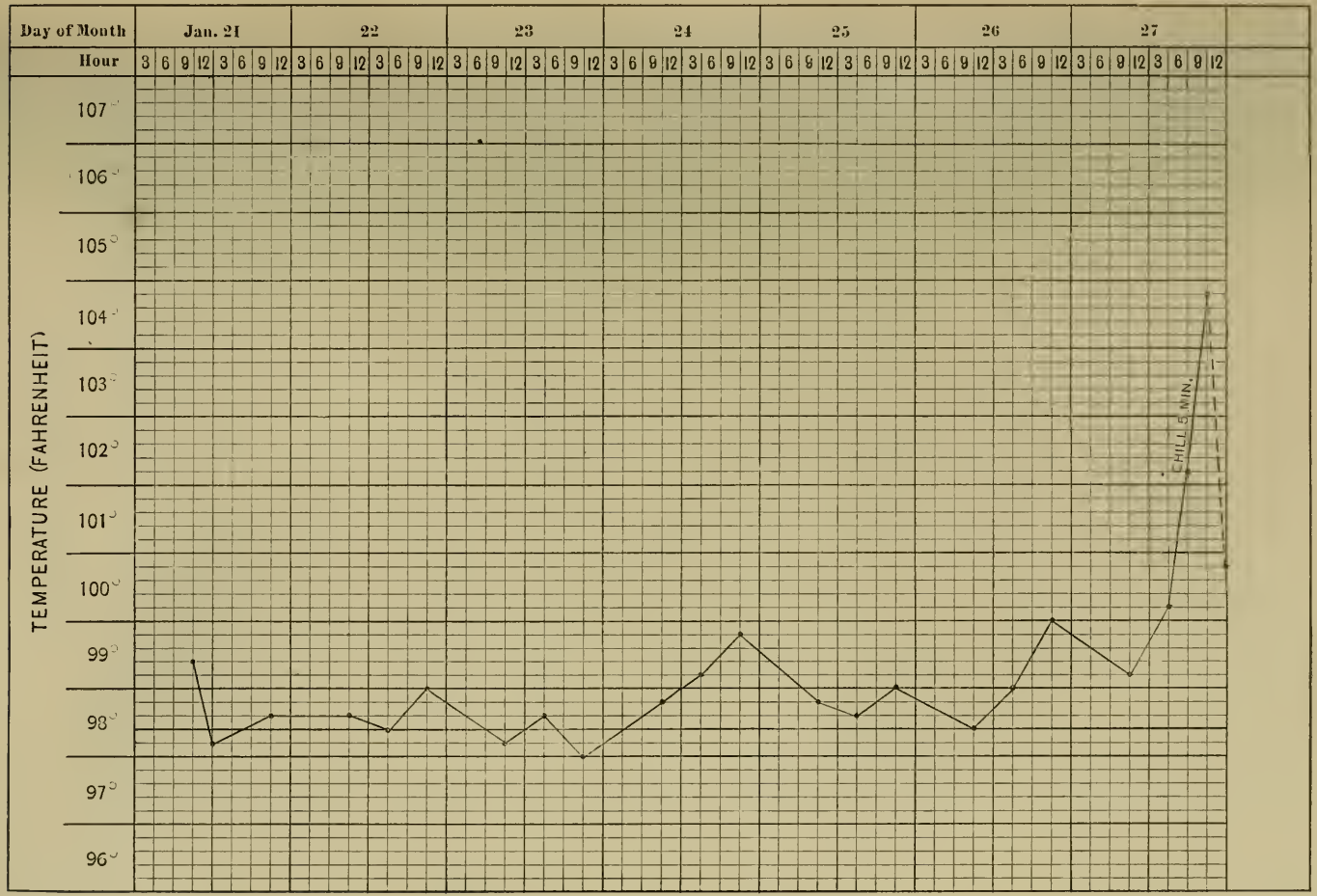
Case VI.—*Mitral stenosis and insufficiency.* M. F., female, thirty-one years, single, domestic. Admitted October 1, 1902. Died October 4, 1902.

Measles in childhood. Acute articular rheumatism one year ago. Fracture of left wrist and left leg by falling down a flight of stairs about same time.

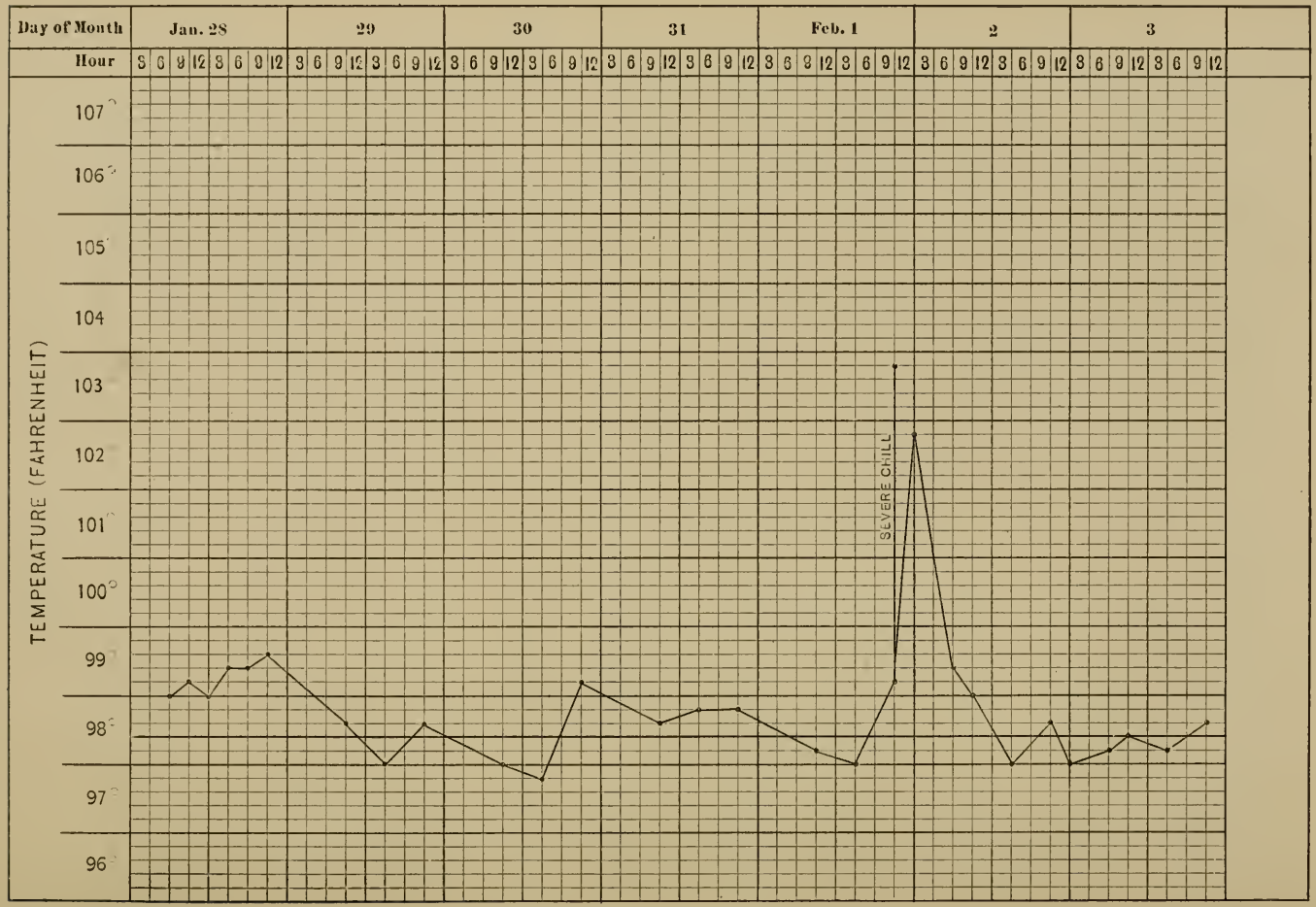
Present Illness.—Of indefinite duration. Chief complaints shortness of breath, cough, palpitation, bloody expectoration, swelling of legs, vomiting and chills.

Physical Examination: Heart.—Thrill at apex, presystolic-systolic murmur at apex and in pulmonic area.

TEMPERATURE 1ST WEEK M. H.



TEMPERATURE 4TH WEEK M. H.



TEMPERATURE 5TH WEEK M. H.

Petechiæ.—On conjunctiva and soft palate day of admission.
Liver.—Tender.
Temperatures 101 to 104.4. Red blood cells in urine, Hgb. 72%, white blood cells 21,600.
No autopsy.

Other authors have had trouble with the nomenclature of cases similar to the six here briefly narrated. Bouillaud 1824-1832, spoke of acute endocarditis with pyemic symptoms. In 1880, Wilkes spoke of arterial pyemia. Osler, I believe, introduced the term malignant endocarditis, because of the proneness to a fatal issue (Goulstonian Lectures, *Brit. Med. Jl.,* 1885). Other names applied to such cases have been infective endocarditis, diphtheritic endocarditis, mycosis endocardii, malignant ulcerative endocarditis. Dreschfeld in Allbutt's Syst. of Medicine places them among the septic diseases, yet Litten very pointedly asks (Deutsch Med. W., May 22, 1902) "Are we justified in calling an endocarditis septic because micro-organisms are found in the blood?" He thought not, and inquired: "What would become of this view if a bacterial basis were established for acute articular rheumatism?" I might add that a possible source of error may lie in the fact that a patient with an old valvular lesion may acquire a bacteriemia from some intercurrent disease entirely independent of the heart condition and without fresh involvement of its structures. On the other hand, it must be admitted, that with the introduction of new and more favorable media, organisms may be found in blood cultures of cases of malignant endocarditis in which at present the results are negative. This may have applied in the past to cases of gonococcal endocarditis.

An exceptional attitude is taken by Gibson (Diseases of the Heart and Aorta). He does not discuss the malignant or septic type as an entity at all, but classifies all types clinically into three groups: Acute, subacute and chronic. He believes that most cases of acute endocarditis are of "septicemic origin." Adams in the Jacobi Festschrift (p. 433) also bemoans the confusion in the classification, "The descriptive adjective being subject only to the license of the author."

Dreschfeld has described four varieties of infective endocarditis: The septic, the typhoid, the cerebral and the cardiac. Broadbent (Heart Disease, 3rd edition, p. 29) protests against this classification as misleading and unsuitable. He says that in the first three types

the *essential feature* is the presence in the circulation of pyogenic micro-organisms sufficient in number and virulence to destroy their host, and that the affection of the endocardium is secondary and of minor importance and the cardiac symptoms usually ill-marked. He deems it advisable, therefore, not to include these types of septicemia under "infective endocarditis." He wishes the term restricted to cases running a more chronic course, in which the micro-organisms attack a valve already diseased and the cardiac symptoms are prominent. To me, this protest does not appeal, because it accentuates a difference in the severity, duration and extent of the infection rather than any difference of underlying cause. This classification makes for convenience of observation, study and instruction just as classification into salient types of typhoid fever, pneumonia and other diseases serves a similar purpose.

ETIOLOGY.

A list of different organisms actually recovered from the blood during life and from the heart lesions(?) after death is a long one. The most frequent appear to be the pyogenic organisms: Staphylococcus, streptococcus, pneumococcus, meningococcus (Warfield and Walker quoted *Med. Record,* Feb. 20, 1904, p. 302), bacillus coli, gonococcus, typhoid bacillus, micrococcus aureus and streptococcus mucosus capsulatus. It must have been an oversight for Gibson to say in 1898 (loc. cit. p. 395): "That it appears doubtful whether diphtheria can give rise to endocarditis," when Howard had already published in 1893 a fatal case of "ulcerative" endocarditis of the mitral valve due to the diphtheria bacillus (*Johns Hopkins Hosp. Bull.*, Vol. iv). In the discussion which followed the presentation of the case Welch characterized it as the first recorded case of "diptheritic endocarditis." In fact, Gibson contradicts himself on a subsequent page (405) when he says: "The Klebs-Loeffler bacillus may be present in those out-of-the-way cases of endocarditis appearing during the course of diphtheria."

In studying the etiology of my cases, the most striking feature is the predisposing influence of pre-existing chronic endocardial disease.

First case, cardiac trouble from infancy, clubbing of fingers and toes.

Second case, cardiac trouble in childhood, hypertrophied dilated heart.

Third case, uncertain.

Fourth case, chorea, acute articular rheumatism and cardiac trouble eight years.

Fifth case, blood-tinged sputum four years before, dyspnea and edema of legs one year, slight clubbing of fingers.

Sixth case, acute articular rheumatism one year before, uncertain.

This agrees with the experience of other observers. In Kanthack and Tickell's 84 cases with autopsies observed in St. Bartholomew's Hospital from 1890-1897, 85% had old cardiac lesions.

In this connection, I would mention the experiments of Wyssokowitch made under the guidance of Professor Orth which have been referred to by most recent writers on the subject. He produced endocarditis in animals by injecting staphylococci and streptococci into the blood *after injuring the aortic valve* by introducing a sound into the carotid. I must mention, however, that Ribbert succeeded in producing myocarditis and endocarditis in the rabbit by injecting a potato culture of staphylococcus aureus *without previous injury.* In both series of experiments, the micro-organisms appeared to infect the valves directly from the blood current—a type of mechanical inoculation—though Koster had shown (Virch. Archiv. Bd. 72) the great probability of the *embolic* origin of the process in the human subject when he saw groups of capillaries stuffed full of micrococci and could follow them into the arterial branches.

AGE.

All of my cases were young individuals between seventeen and thirty-one years. This is not entirely explained by the fact that I have only an adult service, for there are many cases of old people with valvular lesion, and they give no contingent to the acute infective type. My experience is also in agreement with that of other writers. I will only mention Dreschfeld's 45 cases (Allbutt) the average age being 33 years. Adams (loc. cit.) was able to collect only 47 cases in the whole literature of the subject affecting children under 14 years of age. In the children's service at Mt. Sinai, out of a total of 527 cases of all

kinds in the year 1905 there were 43 cases of endocarditis, and only one of these was of the malignant type.

CAUSE AND TIME OF INFECTION.

To fix the cause and time of infection is attended with a great deal of uncertainty and in many cases it is an impossibility. This is partly because hospital cases come under observation long after such infection has taken place,because the causes of such infection are so manifold and have so many possible portals of entry and because in many cases the infecting lesion is a very slight one.

In Case I, the otitis media may have been the source.

In Case II, possibly a slight pneumonia.

In Case III, possibly a slight tonsillitis two weeks before admission.

In Case IV, unknown.

In Case V, unknown.

In Case VI, unknown, unless it be fracture of wrist and leg.

Of the symptoms the most interesting are the fever, the petechiæ, symptoms due to infarcts of internal organs, and the glandular enlargements.

FEVER.

Fever is almost always present, sometimes with wide daily ranges (see chart E. B.). Still exceptional cases occur in which there may be no fever during part of the course, as during the first week in M.H. (see chart page 51). Fazio reports a case fatal in six weeks without fever (*Gazzetta d. Osped.*, 1903, XXIV No. 29). Chart of case H. E. (pages 43 and 44) is probably more characteristic than either of the oth r two. It is worthy of note that the three cases in which the blood cultures were positive (H. E., E. B., E. D.,) were the ones with the most striking septic or pyemic curves, though I do not wish to say that this is always so; in fact in the case H. E. the blood finding was positive at a time when the curve was not pyemic and negative when the curve was pyemic in character.

PULSE.

The pulse-rate as a rule varied with the temperature, and no diagnostic and prognostic hints could be obtained from it.

PETECHIÆ.

The presence of petechiæ in the skin, however, very much strengthened the diagnosis of malignant endocarditis. They were present in all six cases at one time or another. In several cases they appeared in successive crops. They were not always present on admission. In three cases they did not appear until 17-26 and 28 days later (cases A. S., H. E., E. D.). There was no regularity in the appearance of successive crops. Thus in one case (E. D.) there were intervals of one, six, seven and even 20 days. The presence of conjunctival petechiæ has been mentioned by various authors. The importance of this observation is increased by the fact that sometimes petechiæ are found in the conjunctiva before they occur elsewhere. This was so in cases E. D. and E. B. In fact in case E. D. the eyelids were the only site involved for two months and five days, at which time they first appeared on the skin.

RELATION OF PETECHIÆ TO CULTURE FINDINGS.

Contrary to expectations, blood cultures made 24 hours after fresh crops of petechiæ proved negative on two occasions (cases A. S., E. D.). It may be that cultures taken immediately upon their discovery might have given a different result. In one of these cases (E. D.) the culture was positive (streptococci) on April 19th a day *before* a fresh crop of petechiæ. Repeated negative cultures (three times each) in two cases (H. E., E. D.) in which the findings had previously been positive, suggest caution in laying too much stress upon negative cultures.

RETINAL HEMORRHAGES.

These were found in three cases, once not until three days before death (E. B.). Their presence seems to forebode an early dissolution. Death occurred in five and six days respectively after their discovery in the other two cases.

SPLENIC INFARCTS.

Proof of splenic infarcts from the presence of a perisplenic friction sound was found but once (M. H.). The enlargement of the spleen found in three cases was in all probability mainly due to the old valvular lesion.

URINE.

The urine of five of the cases contained red bloodcells at various times. In one case (E. D.) their appearance coincided several times with that of the petechiæ in the skin—they were probably of embolic origin; in the other cases they may have been due to the accompanying nephritis.

OTHER EMBOLIC COMPLICATIONS.

Two of the cases were complicated by cerebral emboli, and one by embolic aneurism of the ulnar artery (H. E.), probably bacterial in origin. That these aneurisms need not always be of bacterial origin has been shown by Libman in a case occurring in the hospital. Repeated blood cultures had been negative, the autopsy showed no acute endocarditis but a large mass of calcareous vegetations and a piece of lime in an aneurism of the iliac artery.

ENLARGEMENT OF LYMPHATIC GLANDS.

This is a symptom not generally mentioned in connection with malignant endocarditis; its occurrence in three out of my six cases (E. B., E. D., M. H.,), justifies a more frequent searching for this sign. As a rule the glandular enlargement does not appear to be accompanied by a leucocytosis, as the highest count in one case was 7,400 (E. D.), in another 7,800 (M. H.) and in a third (E. B.), the count varied from 11,000 to 21,000.

DIAGNOSIS.

Just a few more words about diagnosis. By reference to the histories it will be observed that in all of the six cases here reported there was plain evidence of cardiac involvement. This naturally made the diagnosis easier. But all authors agree that there may be neither auscultatory nor percussion evidence of cardiac disease, and the diagnosis may thus be rendered more difficult. I have seen such cases myself. Romberg says the heart can act quite normally (as it did in 16 out of 42 cases) in spite of enormous endocarditic deposits on mitral, tricuspid and aortic valves, and offers the interesting explanation that the excrescences are so soft in these cases that they do not disturb the opening and closing of the respective orifices. On

the other hand the *gradual* evolution of a murmur, with progressive changes in its character from day to day and week to week, has been looked upon as strong corroborative evidence of cardiac involvement in cases giving other evidence of sepsis. But this is not always so. I had striking proof of that fact this winter. In a case of cryptogenetic streptococcemia in a girl of 16 years, with chills, fever and sweats, jaundice, repeated positive blood findings, multiple thrombophlebitis and suppurating joints, there was such a progressive evolution of a bleating murmur in the pulmonic area, and at the autopsy the heart and valves were found to be normal. The murmur had been of purely hemic origin.

ELIMINATION OF BACTERIA.

Churchman has written in *American Medicine* (Vol. xi., No. 3, p. 111) a very complete review of the literature of the bacteriology of the urine in relation to surgery, and concludes that "the normal kidneys—while possibly not absolutely impermeable to bacteria—play a very unimportant rôle in helping to rid the body of organisms. Only when they or their vessels have been injured do the bacteria escape in any quantity. Organisms brought to the normal kidney meet their fate, for the greater part at least, by passing into the gland substance rather than through it into the urine." I am sorry that this question of elimination in the urine was not studied in a routine way; I have only one positive case to report, that of H. E. in which streptococci were found once. This limited *finding* is under the circumstances no criterion of the frequency of excretion of bacteria by the kidneys in such cases.

TREATMENT.

Most writers agree that at present cases of malignant endocarditis are beyond our control. Treatment was of no avail in any of my cases in averting the fatal issue. Besides the use of a variety of cardiac stimulants (caffeine, digitalis, strychnine, sparteine, digitalone and camphor) which entered more or less into the treatment of all the cases, sodium salicylate was given to three cases—in one of these as high as xxv gr. every two hours for one day, in another xx gr. every two hours for four days.

Broadbent considers salicylates as "worse than useless." To me, however, there appears justification for their use in the fact that they are valuable in benign endocarditis, and in the beginning the differential diagnosis may be uncertain. In two cases inunctions of ungt. Credé was employed, in the case E. D. twice a day for 17 days, then once daily for 39 days, making the whole inunction treatment cover a period of eight weeks. In one case (E. B.) an intravenous injection of 1 c.c. of a 10% silver nitrate solution mixed with 500 c.c. of water was tried. A number of writers refer to the use of quinine. Romberg (p. 365) mentions prompt improvement after the use of this drug, and ultimate recovery. He is careful to accentuate, however, that this was *after* and not necessarily *because* of its use. I believe that a more extended trial of this drug ought to be made in carefully observed cases. It was used in but one of those here reported (E. B.) and it did not appear to be of service; but the administration was not begun until six weeks after the onset of acute symptoms, and this can scarcely be regarded as a fair test.

Much was expected by the profession from the various sera. Thus far the results have been very disappointing, and my personal experience with them in the mixed infection of tuberculosis, in sepsis without endocarditis, and in a private case of pneumococcus endocarditis have not impressed me with their value. Still Nathan Raw reported recovery in two cases of malignant endocarditis with polyvalent antistreptococcus serum (*Lancet*, April 21, 1906). Theoretically intravenous injections of dilute formalin solutions promised some favorable results, but W. H. Park's conclusion that they were dangerous in septicemic rabbits discouraged me from their employment.

For the culture methods employed in these cases I must refer the reader to the report of Dr. Libman of the pathological department published in this volume.

REPORT OF A CASE OF CREEPING ERUPTION (LEE).

By N. E. Brill, M. D.,
ATTENDING PHYSICIAN.

Infection of the skin by dipterous larvæ is of rather unusual occurrence. The fact that but few cases of such infection have been reported, has induced me to record the following case, which in all its aspects is identical with the form of cutaneous myiasis, known by the names of creeping eruption (Lee), larva migrans (Crocker), hyponomoderma (Kaposi), myiasis linearis migrans œstrosa (Kumberg), epidermiditis linearis migrans (Kengsep).

The patient, Joseph S., aged 59 years, in whom this infection was detected, entered my service on Oct. 25th, 1906, suffering from the effects of an advanced emphysema, chronic bronchitis and myocarditis. For the purpose of this report his history, excepting as relating to the skin affection, need not concern us.

About two and one half years before entering the hospital whilst working in low cut shoes in the fields in Florida, he suddenly was attracted by a sticking and itching sensation on both ankles, to which, at the moment, he paid no attention. On removing his stockings that evening he noticed what he said was a red pimple on each foot "over the inner side of each ankle." The pimples were elevated, itched intensely and soon extended in a line up each leg, advancing irregularly and rapidly in a drawn out raised line about 1/8-inch wide and about the same height. The older part of the line would become less elevated, was scaly and lost its bright red color. This characteristic was preserved throughout its course. The recent part of the advancing eruption caused great annoyance by its itching, especially when he took off his clothes. When the eruption on the left thigh had reached the groin it stopped advancing. On the right thigh, however, it continued to advance on to the abdomen, across the abdomen to the left side, up the left side of the thorax to the armpit, across the

chest to the right side, down the right side of the thorax to the upper part of the abdomen, thence around to the right side of the back and up and across the back to the left shoulder, from which it extended down the left arm to the forearm and finally to the dorsum of the left hand, where it was seen when he entered the hospital.

On examination on Oct. 20th, 1906, there was a linear eruption, extending in an irregularly looped and gyrate course from the base of the proximal phalanx of the left index finger, backwards along the skin covering the second metacarpal bone, across the space between the index finger and thumb, where there was a complete loop at the base of the first metacarpal bone, and ending in an intensely bright red, rounded extremity. In color the apparently old part of the eruption was a brownish yellow, flat and scaly; in its fresher or more recent part it was pinkish, raised, and looked as if it had been vesicular; in the freshest part about the base of the metacarpal bone of the thumb it was distinctly vesicular with constrictions at irregular intervals varying between 3 mm. to 6 mm. giving an irregularly beaded appearance. Here its elevation was about 2 mm. and its width about 3 mm. A little serum oozed from one of the older beads. The constriction did not extend through the line of eruption but simply indented the elevated arc. No trace of the old eruption described by the patient could be seen.

The eruption presented, therefore, the characters of the skin disease which was first described by Dr. R. J. Lee of London, Eng., as creeping disease or creeping eruption.

During the patient's stay in the hospital the skin lesion slowly advanced, making another loop around the thenar prominence, its advance being relatively slow, the maximum advance in twenty-four hours being 2 cm., and the minimum not measurable. Whether the progress was influenced by the various forms of topical applications or not cannot be determined. Constant persuasion to permit excision had no avail.

Numerous attempts were made to obtain the parasitic larva by pricking with a needle under a magnifying glass, but without success. The black speck described by Samson-Himmelstjerna in the skin ½ cm. beyond the advancing eruption could not be seen.

Lee's* description of this disease dates from 1874 when he presented to the Clinical Society of London a report of a patient of three years of age whom he had seen three weeks after the beginning of the eruption. In this patient the eruption started below the right ankle and gradually extended up the leg and thigh to the abdomen. A few months after this case had been reported, Lee saw another example of the same eruption in a man suffering with cardiac disease. The patient stated that the eruption dated from his use of a public water closet at a railroad station of a small town in England and that it appeared on the right buttock.

The infected skin of Lee's first patient was removed at the site of the most recent portion of the lesion for an area of about a shilling, and it was submitted to a commission consisting of Howship Dickinson, Dyce Duckworth and Tilbury Fox who reported to the Clinical Society that they could come to no definite conclusion as to the cause of the affection.

Lee† reported his second case about ten days after his observation, stating that he had delayed reporting it earlier in the hope that somebody, having had similar experience with the disease, may have offered some explanation about it. He advised his second patient to have the skin excised, but the patient refused.

Lee expressed the surmise that the cause of the eruption in these two cases might be "an active parasite or animalcule."

In 1892 H. Radcliffe Crocker saw a patient who had been sent to him by Travers Smith for a diagnosis as to a skin lesion. He recognized its similarity to the cases of Lee and gives a good drawing of the eruption in his Atlas (Plate xciii., Fig. 2 and 3).

Later, in his text book on skin diseases, Crocker gives the designation of larva migrans to the disease.

At a meeting of the German Dermatological Congress in 1895. Neumann‡ of Vienna described a similar case and presented a model in colors of the eruption which appeared on the skin of his pa-

*R. J. Lee. A case of creeping eruption. Clinical Society's Transactions, London, Vol. viii., p. 44, 1875.

†R. J. Lee. Short notice of a second case of creeping eruption similar to that described in Vol. viii, Clinical Society's Transactions, read Jan. 11th, 1884. Clinical Society's Transactions, Vol. xvii., p. 75, 1884.

‡Neumann's Arch. of Derm. and Syphilis, Vol. xxxiv., Sept. 1, p. 405, 1896.

tient. He called the disease "a new skin affection." The case gave rise to a free discussion in which Dr. Petersen called attention to some observations which had been made by some Russian physicians and which appeared in *Vratch* for that year on what seemed to be a similar skin affection.

Neumann's patient was a child of three years in whom the eruption appeared on the buttock. The skin was excised and the eruption disappeared.

The observations to which Petersen called attention followed as a result of a communication in *Vratch,* 1895, by Samson-Himmelstjerna who described an eruption which he had observed for the past two autumns in a number of patients while practising in Southern Russia. His description corresponds in all essential details to that of Lee. He recovered a parasite from the skin over the end of the linear eruption which looked like a fly larva. He remarked that by the use of a lens a black point could be detected in the unaffected skin about ½ centimeter from the inflamed end of the eruption. He asked in his communication for information among his colleagues as to similar experiences.

Sokolow in a following number of *Vratch* replied that as early as 1888 he had extracted a small worm from a patient with a similar eruption and then remarked its resemblance to the larva of a fly. Since that date he had seen other cases and he describes the larva as being 1 mm. in length, consisting of ten segments and being provided with hooklets and apparently two suckers. He could see black nits adhering to the hairs in the neighborhood of the linear eruption.

The editor of *Vratch* gave a parasite removed from one of Sokolow's patients to an entomologist who decided it to be the larva of a botfly, family *Œstrus*, genus *Gastrophilus*.

In 1898 Kaposi described the case of a patient in Austria who had this eruption. Kaposi suggested the name of hyponomoderma for the disease, but was unable to secure the larva.

In 1902 Van Harlingen* of Philadelphia reported three cases

*Van Harlingen, American Journ. Med. Soc., Sept., 1902.

of what he described as "creeping larvæ in human skin" and noted their resemblance to Lee's and the other cases. He did not find the larva, however, in any of his cases.

In 1903 Stelwagon*, also of Philadelphia, described two similar cases.

In 1904 appeared one of the most important contributions to the subject of "creeping eruption" in the publication by Dr. Louis P. Hamburger† of Baltimore who gave the history of an imbecile boy of four years in whom he discovered the eruption. The entire literature of the disease from Lee's first description up to the date of Hamburger's publication is given as well as a description of the offending larva. I have made use of his article for many of the references herein contained. Hamburger excised the skin at the end of the actively growing line, made sections of it and was unable to recover the parasite.

In the same year Stelwagon‡ in a second publication describes the eruption in a second patient, a male adult, in whom the disease started on the dorsal aspect of the left foot. In this article he refers to a personal communication received from Dr. G. W. Wende, of Buffalo who had a knowledge of three cases other than those reported.

The last publication was a Russian one coming from Kengsep§ of Dorpat who reported the disease in an infant of two years. He suggests what would seem to me to be the best appellation for the disease, "epidermiditis linearis migrans."

It is a noteworthy fact that only in the Russian cases has the larva which produces this peculiar linear creeping eruption been isolated. Notwithstanding attempts by all other observers who have seen the disease to recover the offending parasite, the larva has eluded them.

I think it is a justifiable assumption to regard all the other than Russian cases to be due to a wandering parasite, most likely

*Stelwagon, Journ. Cutan. Diseases and Syphilis, Nov., 1903.

†Hamburger, Journ. Cutan. Dis., p. 217, 1904.

‡Stelwagon, Journ. Cut. Dis., p. 359, 1904.

§Kengsep, Med. Soc. of Dorpat. St. Petersburg Med. Wochenschr., Nov. 22, p. 531, 1905.

a larva of some dipterous insect closely allied to the larva discovered in the Russian cases. The fact that the clinical histories of all the reported cases are identical in most of their aspects would be sufficient to justify such an assumption.

PRIMARY SARCOMA OF THE STOMACH—REPORT OF THREE CASES.*

By Morris Manges, M.D.,
ATTENDING PHYSICIAN.

Although it is true that sarcomata must be included among the rare tumors of the stomach, yet recent studies have demonstrated that they may possibly occur more frequently than is generally supposed. Fenwick is probably not far from the truth in his assertion that they constitute from 5 to 8 per cent. of all gastric tumors. In proof of his claim he urges that the greater number of cases has been reported since attention was especially called to their occurrence by Virchow, forty years ago, and that the re-examination of some specimens which had been catalogued as gastric cancer has demonstrated that the tumors were really sarcomata. Furthermore, that although Schlesinger was able to collect only 30 cases in 1897, yet in November, 1900, the number of cases exceeded 60. Rosenheim also states that sarcomata are not as rare as is supposed. Perry and Shaw found four cases of sarcoma in 50 cases of malignant disease of the stomach; Haberkahndt found three sarcomata in 207 pyloric resections; while Czerny found only two sarcomata in 298 gastro-enterostomies. Yates reports four cases, two of which were operated upon within nine months.

Two of the cases which I shall report occurred within one year at the Mt. Sinai Hospital. Dr. Harlow Brooks informs me that in addition to the case which he published in 1898 he has since been able to collect three additional cases during nine years' service at Bellevue Hospital.

That uncollected cases may be scattered through the literature was strikingly shown to me recently when, while hunting up a false

*This paper is a revision of the article which was published in the Medical News, July 29, 1905.

reference in the transactions of the London Pathological Society, 1889, I found an unreported case of diffuse gastric sarcoma.

On the other hand, Alesandri, whose article is one of the most recent on the subject, still maintains that they are very rare. This question is of interest, not so much from a diagnostic and pathological standpoint, as to that of prognosis, since the results of operation in some cases of sarcoma are decidedly better than in carcinoma as is well shown in Dock's case in which a large lymphosarcoma was removed over four years ago. I have learned from a personal communication in 1905 from Prof. Dock that the patient was still alive and well. It is possible, therefore, that in the absence of more definite pathological details on the subject, some of our observations on the operative results of carcinoma of the stomach may be modified.

To consider many of the details of the pathology, symptomatology, etc., is scarcely necessary, since much of it would be a useless repetition of what has already been well presented by Schlesinger, Fenwick, Alesandri and other writers. Hence it will suffice to call particular attention to certain practical features:

1. That the new growth arises from the submucosa or muscularis, the mucous membrane being involved only late in the disease as a secondary result, or it may escape entirely. The curvatures, especially the greater, are usually involved, the pylorus being less frequently attacked.

2. The growth may be diffuse, as usually occurs in lymphosarcoma or it may be circumscribed, this being the ordinary form of the spindle-celled type. These circumscribed growths often assume a polypoid form, growing either into the lumen of the stomach, or outwardly into the greater or lesser peritoneal cavity. These polypoid tumors constitute a very puzzling group, the diagnosis of which is exceedingly difficult, since it is in these cases that the mucous membrane is usually intact while few if any of the symptoms draw attention to the stomach as being the real source of the neoplasm.*

3. The orifices are rarely stenosed and if the pylorus is involved

*A case of this kind has recently been reported by Muscatello; abstracted in Zentralblatt für Chirurgie, 1907, No. 14.

the stenosis never reaches the degree so frequently encountered in carcinoma.

4. Degenerations frequently occur in these tumors. These include hemorrhages, cystic degeneration, formations of fistulous tracts, etc. On the other hand, it is to be noted that sometimes the sarcomata are themselves degenerations of other benign tumors such as fibromata, myomata, etc.

5. As regards size, they may constitute large tumors (weighing 12 pounds or more), or they may be so small as to be found only by mere chance at autopsy.

6. They may be primary or secondary. The latter are the rare forms, except in lymphosarcoma where the secondary forms are commoner than the primary. Doubt has even been cast upon the cases of primary lymphosarcoma since it is urged that some small primary lymph-gland tumor may have escaped notice. These secondary lymphosarcomata are usually derived from some growth in the neck, pharynx, gums, rectum, retroperitoneal sarcoma, etc., or they may constitute part of a general lymphosarcomatosis of the gastro-intestinal tract, or they may be an internal manifestation of Hodgkin's disease.

7. Metastases may occur in neighboring or distant organs, or they may be absent. The distant organs may include the skin, testicles, tongue, tonsils, rectum, etc. The skin metastases are of particular interest since their occurrence is much more frequent than in cancer and may thus afford much important diagnostic information.

8. *Age.*—The range is very great. Finlayson's case occurred at three and one half years and the case of Malvoz occurred at seventy-eight. Fleiner states that they may even be congenital. As a rule the average age is younger than in carcinoma; thus the four cases of lymphosarcoma reported by Perry and Shaw were fifteen, eighteen, thirty-eight and sixty-seven years old.

Special attention may be directed to a group of cases with gastric symptoms in which hematemesis is the leading symptom. Although it has been shown that bleeding is a relatively infrequent symptom in gastric sarcoma and is used as one of the points of differential diagnosis, yet cases have been reported in which the bleeding was

either an early or a late symptom and even led to that mistaken diagnosis of gastric ulcer.

One of the earliest cases with hematemesis is that of Hartley to whom I am indebted for the following report:*

Mrs. B., fifty-four years. Five years ago (1890), without any special cause, she vomited a large amount of coffee-ground material. The vomiting did not recur and she went on for four years in fair health, except for the heavy feeling after eating. One year ago she again vomited blood of coffee grounds and clotted in character for five mornings in succession; this was again without cause or exacerbation of gastric symptoms. The pain in the back which she had suffered previously became much worse at this time and she noticed a considerable swelling of the stomach.

Physical Examination.—In the left lumbar and left umbilical region is a rounded tumor about the size of the adult fist, which is hard and elastic, freely movable and easily displaced up into the left hypochrondriac region.

Operation.—April 26, 1895. Incision 5 in. long, just to the left of the left rectus; the hand was introduced and prolonged search made. The kidney could be felt in place, the large intestine bulged into the wound and was normal; behind the mesocolon and in what appeared to be the position of the spleen was the large tumor; the spleen was not felt. The mesocolon was torn through and the surface of a tumor in lesser peritoneal sac disclosed. This tumor was brought through this opening in the mesocolon and it was seen that it arose from the posterior wall of the stomach by a pedicle 1½ in. in diameter. The stomach was pulled well out and grasped by house surgeon well below the pedicle. The stomach was now cut through entirely around the pedicle and a circular part of stomach wall excised. Abdominal wound closed in usual manner with drainage in center.

Pathological Report.—By Dr. Ferguson, May 10, 1895. The material is a pear-shaped tumor measuring 15x10x8 cm. Its surface is smooth but nodular. It is apparently covered by peritoneum The tumor is cystic, the cysts varying in size from ½ to 4 cm. in diameter. The tumor is firm in consistency and of pale gray color. An area of stomach wall 5x4 cm. has been removed with the tumor, the mucosa has not been ulcerated but is intensely hyperemic. Sections show the ordinary appearance of spindle-celled sarcoma. The

*This is the case which was published in the Annals of Surgery, 1896, Vol. xxiii., p. 609.

vascular supply is abundant, some of the vessels being large with thin walls.

Discharged cured, June 1, 1895.

Case II, which I present, was also marked at its close by severe hemorrhages from the stomach and bowels.

Oberst has also published a paper in which he directs especial attention to this group of cases; he reports a case of gastric sarcoma (man, twenty-five years old) which was mistaken for a gastric ulcer. He also quotes a similar case of Robert and two of Kundrat. He therefore urges that the possibility of gastric sarcoma should be considered in youthful individuals with hematemesis in which the course is unusual or in which there is delayed convalescence after hemorrhage of the stomach.

Symptoms.—The cases may be divided into two great groups: First, those without; and second, those with gastric symptoms.

In the first group are included the cases in which the tumor grows outwardly into the peritoneal cavity and also many of the cases in which the growth is toward the gastric lumen but in which the infiltration of the stomach does not involve the pylorus and leaves the mucous membrane intact. This group includes the unusual cases of abdominal tumors which have been incorrectly diagnosticated, the true condition being revealed at operation or at autopsy.

The complications from the peculiarity of the growth may dominate the picture, such as adhesions, torsions, displacements, hemorrhage in the tumor, cystic degeneration, suppuration, etc., or, metastases may cause leading symptoms such as disturbances in the intestines, rectum, etc. One peculiarity of the intestinal metastases is to be noted—that they rarely cause stenosis, being thus unlike the secondary growths which occur in gastric carcinoma in which stenoses may much more frequently occur.

In the second group the gastric symptoms are practically those of gastric cancer. In most cases, however, the gastric symptoms are mild and only become marked toward the end of the patient's life.

A few points of differentiation may be noted. That vomiting and hemorrhage are less frequent and are usually only late symptoms.

On the other hand, pain, fever, albuminuria, marked anemia and weakness are more marked and occur much earlier; indeed, the marked anemia and weakness may for a long time be the only symptoms. The appetite may fail, or, as in gastric cancer, may persist throughout. Perforation occurs more frequently. Marked splenic enlargement is much more frequently noted than in gastric cancer. On the other hand, omental and peritoneal involvement are less common. The skin metastases have already been referred to. A number of other minor conditions have been reported; still they are too inconstant to be of great differential diagnostic value.

The physical signs are inconstant as is readily understood from what has already been said concerning the pathology. Fenwick states that tumor was present in only 30 per cent. of the cases, and when the tumor was present it was frequently mistaken for tumor of the spleen, of the pancreas, kidney, omentum, ovary or retroperitoneal glands.

There are great variations in the size of the stomach since it may be enlarged or contracted or displaced or distorted, as occurs in the unusual cases where there is marked downward displacement of the stomach which is at the same time distorted into a sausage-shape resembling the transverse colon.

The stomach contents have been observed in about ten cases. They are practically identical with those found in cancer of the stomach. In one of the cases which I report the same is to be noted. In one case which was under observation Erlach could follow the transition from normal chemism to complete absence of hydrochloric acid which occurred later in the disease. In several cases there was no change in the gastric secretion. Indeed, considering how long the mucous membrane remains uninvolved it is surprising that there is as much change in the chemism of the stomach as has been reported.

The stagnation in the stomach contents is not due so much to pyloric obstruction in these cases as it is to the infiltration of the muscularis.

Diagnosis.—The possibilities of diagnosis are best summed up in the words of Leube who has allowed them to remain unchanged even in the last edition of his *Diagnostik*: "In my opinion these tu-

mors *cannot be diagnosticated,* not even when the conditions are very favorable for making a clever diagnosis, because of the presence of a general sarcomatosis or cutaneous sarcomata. In one such case, it is true, I found a gastric sarcoma, but in another case of skin sarcomatosis the tumor in the stomach was a true epithelial cancer."

However, if more exact points of differentiation are desired, I may quote the differentiating points given by Fenwick, who claims that "a diagnosis of round-celled sarcoma of the stomach may be made by attention to the following points:

1. The disease usually occurs before thirty-five years of age, so that the younger the patient the greater the probability that the malignant affection is sarcomatous in character.

2. In many cases there is slight but continuous pyrexia, accompanied by rapid and profound anemia, while in carcinoma fever is usually absent during the early stages of the complaint and the cachexia much more gradual in its development.

3. Enlargement of the spleen is by no means infrequent but is rarely met with in cancer unless the organ is involved in the growth.

4. According to Kundrat the tonsils are apt to enlarge and the follicles upon the sides of the tongue may become swollen or ulcerated.

5. Secondary deposits in the skin occur in a notable proportion of the cases and permit of excision and microscopic examination. It should be remembered, however, that sarcomatosis has been met with in true cancer of the stomach (Leube).

6. A large nodular tumor due to infiltration of the omentum and a greatly enlarged liver with secondary growths in its substance are rarely met with.

7. Persistent albuminuria is often observed in sarcoma but is exceptional in cancer.

8. The discovery of pieces of morbid growth in the vomit renders the diagnosis certain (Riegel, Westphalen).*

Prognosis.—As already stated, this in some cases is decidedly

*Schlesinger made the diagnosis in one of the cases from a piece excised from a metastatic mass in the rectum.

better than in carcinoma; in other cases, however, the course may even be more malignant.

Treatment.—If the diagnosis has been made arsenic ought to be used as it is in all cases of lymphosarcomatosis, otherwise the treatment is strictly surgical.

The histories of the three cases I present are as follows:

Case I.—L. S., shoemaker, forty-eight years of age, was admitted to Mt. Sinai Hospital to the service of Dr. Alfred Meyer, September 26, 1903. His symptoms are of four months' duration—loss of appetite, occasional vomiting of food, obstinate constipation. He has lost considerable flesh and strength. General condition fairly good; tongue moist, coated; a few small glands in the neck, axilla and groin. Physical examination negative throughout. Abdomen lax, tympanitic, no tenderness, no tumor palpable; general visible peristalsis. No fever. Urine negative. September 27—Test breakfast (Ewald).—Slightly digested; total acidity 40 per cent.; free hydrochloric acid absent; combined acids 30 per cent.; no lactic acid. Ferments absent.

September 30.—Total acidity 84 per cent.; free hydrochloric acid absent; combined acids 26 per cent.; lactic acid present; no blood. Ferments absent.

He left the hospital October 2 very much improved. He was readmitted on December 7. For ten weeks previous to his readmission he had had fever, pain in the upper right quadrant of the abdomen, the pain having no relation to the ingestion of food. Eructation and cardiac palpitation after eating. Progressive loss of flesh and strength. Vomited only once; no blood. Defecation and urination normal. Chief complaint abdominal pain and weakness.

Physical Examination.—Mucous membranes pale; pupils unequal, the left being somewhat larger than the right. Abdomen: The veins on both sides of the lower abdomen dilated. Liver extends to three fingers below the free border. In the right hypochondriac region a large mass, somewhat irregular in shape, with a sharp edge can be felt; it extends on the right to the mammillary line, on the left it reaches one-half inch to the left of the middle line; its lower border is within one-half inch of the umbilicus; it is dull tympanitic on percussion and not tender; otherwise the abdomen is negative. Urine negative.

Blood Examination.—Thirty per cent. hemoglobin; red blood-cells, 4,000,000; white, 13,600.

Test Breakfast (Ewald).—Two ounces removed; fairly digested;

total acidity 26 per cent.; free hydrochloric acid absent; lactic acid present; ferment absent.

December 10.—The patient vomited a very large amount of undigested food. The mass became much more prominent after this and extended from the right mammillary line to the left parasternal line, above it reached the free border of the ribs, on the right of the mammillary line, midway between the umbilicus and the xiphoid was a sharp edge. Dull tympany over the tumor.

December 12.—Movable dulness in both flanks, fluid in the abdomen. The patient is now running a slight evening temperature. The urine now contains a faint trace of albumin. For the past few days he has had three to four stools daily.

Consent having been obtained for an operation he was transferred to Dr. Gerster's service where a gastro-enterostomy was performed on December 14. Death three days later.

Autopsy seventeen hours after death by Dr. Libman.

Murphy button found at site of gastro-enterostomy, good apposition of stomach wall and jejunum.

Lungs.—Right upper lobe was in incomplete gray hepatization. Both lungs adherent; markedly anthracotic. Pleura showed a moderate number of hard thickenings, some flat, some nodular. Acute pulmonary edema.

Stomach.—Moderately dilated. At pylorus a large, hard nodular tumor adherent to pancreas and duodenum and involving the whole circumference of the stomach for a distance of three inches from pylorus. Parts of the tumor were soft and had undergone degeneration. Pylorus admitted one finger. The interior of the stomach showed the same tumor ulcerated and involving the pylorus and stomach but not the duodenum. In other areas of the stomach wall there were some small hemorrhages in the mucosa.

Liver.—Normal size and consistency. Cloudy swelling (no metastases).

Kidneys.—Capsule of the right adherent. Both acutely degenerated.

Microscopic examination of the gastric tumor proved it to be a lymphosarcoma.

Case II.—Mrs. A. S., forty-eight years of age, admitted to Mt. Sinai Hospital, under the care of Dr. Albert Kohn, August 6, 1904. For years this patient had had repeated uterine hemorrhages, supposedly due to fibroids, for which, however, she had refused operation. Not long before she came under treatment she had several uterine hemorrhages and her intense anemia was supposed to be due to that cause.

She was first seen July 3 with the symptoms of a marked secondary anemia, confirmed by several blood examinations. Loss of flesh and strength were not marked. Complaints were of extreme dizziness, sinking sensations, inability to assume the upright position. Headaches general. Loss of appetite, nausea, eructations. Vomiting only once or twice. She had many movements (9 to 12 daily) which were very loose, tarry and controlled with difficulty. Tenderness over the entire abdomen with pain, both marked over an epigastric tumor which was the size of a peach. The tumor was freely movable and did not disappear under the ribs. Her temperature was never above 101.5° F.; never subnormal.

Blood Examination.—Hemoglobin 18 per cent.; red cells 1,590,000. A few poikilocytes and microcytes; granular degeneration of red cells; moderate relative leucocytosis. Stools contain pus and red blood-cells. Hemin test positive. Urine 1.010, large trace of albumin; no tubercle bacilli.

The diarrhea, loss of appetite, nausea, eructation and obstinate loose, watery stools with small blackish fecal particles, the increasing anemia and abdominal pain and tenderness were the only symptoms. During observation at the hospital the most prominent symptoms were sighing respiration and weakness, diarrhea and vomiting, melena and bloody vomit. The physical examination showed not only a mass in the epigastrium, but two masses, one in each iliac fossa which were apparently new growths. However, on postmortem examination nothing could be found to account for these two tumors. Test-meals could not be given on account of the wretched condition of the patient. She died August 13, 1904.

Autopsy.—By Dr. Buerger. Lungs: Congested at base; few pleural adhesions. Liver: Grayish-brown color, pale, firm consistency; marked parenchymatous degeneration, pigmentation, slightly fatty. Stomach: Externally negative except for a somewhat depressed, scar-like area, 4 cm. proximal to pylorus, in the immediate neighborhood of which are stellate dilated vessels. Capacity somewhat increased; wall slightly thinned. About 4 cm. from the pylorus on the anterior wall there is a soft grayish-pink flattened sessile tumor, almost circular in outline, raised by a rounded though irregularly lobulated convex surface 12 mm. above the surrounding mucosa. It appears even less prominent than this owing to a very marked, raised, somewhat circular, well-defined margin of slightly cicatrized mucosa immediately surrounding it. At one portion it is ulcerated and excavated so as to be on a deeper level than the mucosa of the stomach. Upon section it presents a radiate, irregular, streaky surface, here and there beset by small hemorrhages.

Microscopic examination shows it to be a myosarcoma. Intestines

practically negative except for the presence of altered blood. In the ileum there are several script-like areas of brown pigmentation. No ulcerated areas or any points of bleeding could be found. Uterus contains small submucous fibromata. Bone-marrow red in color, soft, diminution of fatty elements. Kidneys, intense parenchymatous degeneration; interstitial changes in medulla. Spleen congested.

Case III.—R. F., 19 years old, was admitted to my service on March 14, 1906.

Previous History.—Unimportant.

Present Illness.—Is of two months' duration. She has been in this country but three weeks, having been compelled to leave Russia on account of the recent disturbances there. She reached Roumania when the present illness began. For three days before this she had eaten nothing. The first symptoms were epigastric pain after eating. Six weeks ago while she was in Hamburg she began to vomit once or more daily, this having no relation to eating. While crossing the ocean she vomited continually. Since her arrival here she has continued to complain of pain in the epigastrium and left hypochondrium, this pain being made neither worse nor better by taking food. She also vomits frequently. Anorexia and constipation. She has never vomited blood; neither has there been any blood in the stools. She has not lost weight. No fever or chills.

Physical Examination.—Well nourished; she does not look sick. No fever. Heart shows lesions of mitral stenosis. The abdomen is slightly rounded; tenderness is found only in left hypochondrium and in both lumbar regions. Nothing can be palpated except a mass in the left hypochondrium which was regarded as an enlarged spleen with a firm sharp edge reaching two finger breadths below the free costal border. No glands to be felt anywhere. Rectum negative. Urine has a faint trace of albumin, but no casts.

Blood Examination.—Fifty per cent. hemoglobin; red cells 4,800,000; leucocytes 10,000. Polynuclears 53 per cent; large lymphocytes 38 per cent.; small lymphocytes 4 per cent.; eosinophiles 3 per cent.

March 18.—Splenic mass has enlarged to median line. Traces of blood have been found in the stools on several days. Vomits occasionally, but no blood could be found in the vomitus at first; but this was soon reported on several occasions. For this reason the use of the stomach tube was postponed. The chief complaint is the epigastric pain.

March 20.—Tenderness, rigidity and peritoneal irritation about the "splenic mass." Both costal arches are held rigid and compression on right side causes more pain. Left side of abdomen more rigid. No visible peristalsis. Vomits occasionally; vomitus con-

tains traces of blood; microscopic examination at no time shows anything extraordinary. Temperature, which had risen to 101° on 19th, soon fell to normal.

March 22.—Temperature rose to 101.5°, pulse 120. Patient complains of severe pain in the left hypochondrium over the region of the "splenic mass." Distinct evidences of peritoneal irritation in this region; rough creaking râles can be heard over the mass at the end of deep inspiration. Pain is relieved by fixation of the left chest. No change in blood findings or in urine, except that the latter contains a few red blood-cells.

March 25.—Patient's condition gradually becoming poorer. She looks paler; she still complains of the left hypochondriac pains where the creaking râles can still be heard. Abdominal examination is difficult on account of the rigidity. Moderate distention.

March 26.—Sudden change in patient's condition. Temperature rose to 103°; pulse to 148; respiration 32. Vomiting of small quantities of green, feculent material. Pleural râles in right mammary region. The abdomen is more distended, and evidences of peritonitis. Severe pain is complained of in the left side. There is a point of great tenderness on deep pressure in the middle line, three finger-breadths above umbilicus. No change in mass in left hypochondrium. Free fluid was found in peritoneal cavity. Immediate laparotomy was advised and was performed by Dr. Elsberg. On opening the peritoneal cavity through an upper left rectus incision there was a gush of bloody peritoneal fluid. A large tumor which moved upwards and downwards with respiration presented in the wound. On exploring with the finger this was found to be a hard, firm gastric tumor, which had many adhesions to the parietal peritoneum. When some of these adhesions were broken down there was very free bleeding. One part of the tumor seemed to be semi-solid; this area was aspirated, but the needle was immediately withdrawn on account of the profuse bleeding. The tumor being considered inoperable, the wound was closed.

The patient died suddenly a few hours after the operation.

ABSTRACT FROM AUTOPSY REPORT BY DR. EPSTEIN.

Stomach, not enlarged and in normal situation. The organ feels like one large, solid mass; on section it is found that the walls are 2½ to 3 inches thick. The cut surface is very firm, and has a sarcomatous appearance. The new growth includes almost the entire stomach, reaching from 1½ inches below the cardia almost to the pylorus; the orifices are not involved. The lesser curvature is only moderately thickened. The outer surface of the stomach is marked by a number of firm, whitish, longitudinal fibrous bands.

On opening the stomach it is found that the mucosa is intact with the exception of the central portions of both anterior and posterior walls which are deeply gangrenous, this softening extending halfway through the walls. The rugæ are absent. The cardia and pylorus are both free, and are normal in appearance.

The gastro-hepatic omentum contains large metastases.

The liver is moderately enlarged; the edge is smooth and firm. The surface contains a number of larger and smaller metastases. The cut surface is fatty and riddled with various sized nodules ranging from ½ to 1½ inches in diameter. Gall-bladder negative.

The spleen is small, soft and almost diffluent.

The pancreas is firm and in its head there are metastases.

The kidneys show some parenchymatous change and hyperemia. Adrenals negative.

The intestines are practically negative except for a moderate hyperplasia of Peyer's patches in the small intestines, and of the solitary glands in the large. Mesenteric nodes not enlarged.

Microscopic examination of the tumor and the metastases shows a lympho-sarcoma.

COMMENTS.

These three cases show the difficulty of the diagnosis of this class of gastric tumors, as well as the variety of the clinical picture. Case I is absolutely identical with the ordinary course of a gastric carcinoma. Case II was under observation for only a week; yet in that time the leading features were the bleeding and the intense anemia. The intestinal symptoms were equally as pronounced as the gastric, even to the presence of the two masses which were felt in the iliac fossæ, but which were not accounted for at the autopsy.

Case III was equally misleading. The abdominal mass had all the characteristics of a new growth of the spleen; even when it enlarged suddenly a few days after her admission to the hospital it retained this character. It was natural therefore to regard the gastric symptoms as secondary to this condition, especially as in addition her antecedent history included such manifest causes as the starvation and privations in Russia and the sea-sickness. When it did seem advisable to study the gastric chemism the occurrence of the bleeding made it advisable to postpone the use of the tube. However, in the meantime, the local peritonitis due to the gangrene in the new growth caused the operative interference.

One feature which was common to two of the cases deserves mention, namely the absence of any cachexia and the good general condition of the patients even when the disease was far advanced.

LITERATURE.

The literature of sarcoma of the stomach may be found in the following references which include the most important contributions to this subject.

SCHLESINGER: Zeitschrift für klin. Medizin, Bd. 32, Suppl. Heft, 1897. p. 179.

FENWICK: Cancer and Tumors of the Stomach, 1902, pp. 272-283.

ALESANDRI: Mittheilungen aus dem Grenzgebiet der Med. und Chir., Bd. 12, Heft 4.

OBERST: Beiträge zur klin. Chirurgie, Bd. 45, 1905, Heft 2, p. 477.

YATES: Annals of Surgery, Vol. xliv., 1906, p. 599.

A CASE OF GENERAL PHLEBO-SCLEROSIS, THROMBO-PHLEBITIS OF LEFT COMMON ILIAC, MOIST GANGRENE OF LEFT LOWER EXTREMITY; AMPUTATION; RECOVERY.

By Henry W. Berg, M.D.,
ADJUNCT ATTENDING PHYSICIAN.

On September 9, 1906, there was admitted to Mt. Sinai Hospital the following patient whose interesting history is as follows:

Barnett Levine, Russian, tailor, married, no children, wife healthy, age twenty-three years.

Family History.—Negative.

Previous History.—Childhood: Smallpox, measles; otherwise negative. Adolescence: Suffered from some dyspnea on exertion but no other cardiac or nephritic symptoms. No gastric or pulmonary disturbances. Four months ago short attack of tonsillitis. Three months ago attack of earache but no discharge.

Venereal.—Gonorrhea once two years ago. Denies syphilis.

Alcohol and Tobacco.—Drinks in moderation. Moderate smoker. Tea and coffee but not to excess.

Habits.—Sleeps well; appetite good; bowels regular; urination normal.

Present Illness.—Began three weeks ago, with (1) swelling of both feet and legs below knees; (2) pain in feet and legs; (3) *superficial veins of both lower extremities hard, red and tender.* For these symptoms entered Gouverneur Hospital, where he remained six days under treatment and was discharged at his own request. When he returned home he could not walk and remained in bed. One week ago patient noticed swelling in left popliteal space. For past three days leg of same side became more swollen from toes to hip. The leg was swollen, and hard; sticking pains most marked about the knee, which was red and indurated. No chill, no vomiting. Frontal headache since onset. Six days ago, suddenly he was unable to move left hand or left side of mouth. Since his illness has perspired profusely. Appetite poor; bowels regular; no urinary symptoms.

Chief Complaints.—(1) Paralysis of left arm and left side of

face. (2) Swelling, pain, disability, and possibly paralysis, of left leg. (3) Headache.

During Examination.—Twitchings of left side of face, lasting two minutes.

Brought to hospital in ambulance. On admission, temperature 101°; pulse 120; respiration 24.

PHYSICAL EXAMINATION.

General Condition.—Poorly nourished; anemic; facial expression anxious; eyes sunken; sclera bluish; cheek bones prominent; patient bathed in perspiration; sensorium clear but mentally somewhat deficient.

Stature and Development.—Of medium height; light build; weight about 120-130 lbs.; hair on scalp thick, has never lost hair; moderately hirsute on rest of body.

Skin.—Pock marks; papular eruption on chest; some edema lower half of back; some redness about sacrum.

Glands.—Slight enlargement; epitrochlears are slightly enlarged.

Nose, Ears and Mastoids, Vertebral Column, Breasts, Thyroid.—Negative.

Neck.—No rigidity.

Kernig.—100° dorsal flexion right leg; left leg cannot be tested. No cyanosis or clubbing of finger tips.

Skull.—No tenderness to percussion.

Bones.—Negative.

Joints.—Increased fluid in left knee joint; otherwise negative.

Eyes.—Conjunctivæ negative. Eyeballs somewhat prominent. Pingueculæ on nasal side of each eye. Pupils react equally to light and accommodation. No ocular palsies.

Face.—Flattening of left side; face drawn to right when showing teeth. Paralysis of left side. Temporal arteries prominent.

Mouth and Throat.—Teeth and gums in poor shape. Tongue dry and coated with brown fur. Deviation of tongue to left. Soft palate normal. Throat negative.

Chest.—Depression above and below both clavicles.

Lungs.—Anteriorly negative. Posteriorly breathing is shallow. Examination imperfect on account of condition of patient.

Heart.—Apex impulse not made out. Borders: Upper border third rib. Right costo-sternal junction. Left border nipple line. Sounds: Weak and muffled. First apical accentuated. Second aortic accentuated. *Short systolic murmur over base.* Action: Regular, accentuated, poor quality. Pulses: Equal, regular, small, soft and compressible; slight sclerosis and diminished tension; slight dicrotism.

Liver.—Between fourth and fifth to one finger above free border. Indefinitely palpable just below free border.

Spleen.—Obscured by tympany. Indefinitely palpable.

Abdomen.—Some discoloration and *enlargement of venules* of left side of abdomen. Generally tympanitic except for dullness over left flank. *Left half of abdomen moves less in respiration than right.* Swollen and pits on pressure. No masses; no tenderness; no movable dullness at either flank.

Extremities.—Lower extremities:

Right.—Some blueness; is cold; knee jerk present; plantar active; no Babinski; *thickening* and *discoloration along dorsalis pedis vein;* and an obliterating phlebitis. It feels like a thickened cord, is hard. There are no redness, pain or other signs of inflammation. All the other palpable veins are prominent and feel thickened like cords.

Left.—Complete paralysis; enormous edema; skin glossy, no evidence of acute inflammation; superficial blood vessels are congested, prominent and cyanosed; left popliteal space is so swollen that no landmarks can be made out; also much swelling in inguinal region. Left saphenous vein not felt; knee jerk absent. Pulsation in left femoral artery can be felt and counted, although with difficulty owing to great swelling. Babinski present.

Upper extremities:

Left.—Paralyzed; no edema; reflexes present; superficial veins seen as *red streaks, hard, thick* and *easily palpable.*

Right.—*Thickened veins feel like cords under the skin.*

Sensations.—Left Side: Pain exaggerated but touch normal. Sensation of pain present on both sides.

Circumferences.—Left arm: (*a*) 12 cm. above olecranon is 21 cm. (*b*) Forearm 11 cm. above tip of ulna 17.5 cm. Right arm: (*a*) 21 cm. (*b*) 17.5 cm. Arch of foot on left side 26 cm. Arch of foot on right side 23 cm. Right leg 20 cm. below tip of patella 28 cm. Left leg 20 cm. below tip of patella 31 cm. Right knee through middle of patella 35 cm. Left knee through middle of patella 35 cm. Right thigh 15 cm. above upper border of patella 41 cm. Left thigh 15 cm. above upper border of patella 53 cm.

Complains of pain in left extremity when it is disturbed.

Genitals.—Negative.

Rectal Examination.—Prostate enlarged. Slight thickening of right seminal vesicle. Left seminal vesicle cannot be made out.

SYNOPSIS.

1. Poor general condition.
2. Left hemiplegia.
3. Right-sided Kernig.
4. Left-sided Babinski.
5. Thickening, rigidity and discoloration of all veins of extremities. chest and jugulars.

6. Edema of left lower extremity and lower part of left abdomen and back.
7. Enlarged prostate and left seminal vesicle.
8. Mental condition anxious but clear.
9. Excessive perspiration.
10. Edema lower half of back. Redness of sacrum.
11. Increased fluid in left knee.

Eye and Ear.—Examination negative.

Sputum.—Negative.

Stool.—Examinations Sept. 13, 15, 17. 19. 21, 24, negative.

Blood.—Examinations: Sept. 13, Hb. 70 per cent., W. B. C., 12,400; Sept. 18, Hb. 65 per cent., W. B. C., 12,000; Sept. 25, Hb. 49 per cent., R. B. C., 3,310,000; W. B. C., 12,000.

Differential:

Polynuclears	80	per	cent.	}
Small lymphocytes	15	"	"	|
Large "	2.5	"	"	} Count of 200 cells.
Mononuclears	1.5	"	"	|
Eosinophiles	1.	"	"	}

R. B. C.: No variation or abnormality as to size, color, shape or staining qualities. No granular degeneration. No plasmodia. Coagulation time 3.5 minutes. September 27, 1906. Coagulation time 3.5 minutes.

Differential:

Polynuclears	74	per	cent.	}
Small lymphocytes	18	"	"	|
Large "	6	"	"	} Count of 700 cells.
Mononuclears	1	"	"	|
Eosinophiles	1	"	"	}

R. B. C.: Stain poorly, moderate size, uniform rounded shape.

Urethral Smears.—Negative.

Widal.—Persistently negative (10 times).

Blood Cultures.—(2) Negative.

URINE EXAMINATION.

No Ehrlich; no reaction for blood (guaiac): amber to amber cloudy; acid; sp. gr. ranging from 1028 to 1034; no sugar; no bile; urea 4, 1.9, 1.5, 2.3 per cent.; voids fair quantity; albumen at different days: very faint trace, v. f. t., o., f. t., t., trace, f. t., 0, 0, 0; few R. B. C. with albumen.

Microscopical: Pus cells present in fair numbers and with fair consistency. With appearance of albumen few hyalogranular casts.

September 20: Since admission the patient's pulse has ranged from 100 to 130; respiration 24-28; temperature 98-100.

General condition unimproved.

Left leg: *Moist advancing gangrene with some line of demarcation* above the ankle. Gradual return of power in left arm, hands and face.

September 29: No signs of absorption of toxins from gangrenous leg; mental condition clear; sleeps fairly well; appetite retained; bowels regular; urination slight frequency, otherwise normal; pains present in left lower extremity; condition of veins unchanged except discoloration decreased; no deviation of tongue; facial palsy gone; and general condition somewhat improved.

October 19: Owing to enforced position in bed, left leg being held rigid owing to pain and gangrene, the patient has been placed on a water-bed. Nevertheless a large decubitus has developed over dorsal surface of right shoulder and scapula, which is progressive in area and depth. The patient refuses amputation of leg, although the gangrenous leg is decomposing and foul in odor. It may be here stated that the patient refused operation until his general condition had become very bad and the toes and flesh of his gangrenous limb could be pulled off readily with the dressing forceps. He then consented and the leg was amputated.

I have selected this case for presentation for two reasons. First, because of its rarity; for, while many cases of phlebosclerosis or sclerophlebitis are reported in the literature, it is very exceptional to have a polysclerophlebitis in a young individual; and even rarer are cases of this character in which a thrombophlebitis high up of the common iliac veins or possibly ascending vena cava have so cut off the collateral venous circulation as to cause a moist gangrene of the whole of one of the lower extremities necessitating an amputation at the hip. Second, because of the interest attached to the complicating left hemiplegia from which the patient ultimately recovered, and which was due either to a thrombosis of the cerebral veins following a similar sclerophlebitis or an embolus of the Sylvian branch of the middle cerebral artery originating from the thrombus below, a portion of which, carried into the circulation, passed from the right to the cerebral artery originating from the thrombus below, a portion of which, carried into the circulation, has passed from the right to the left heart through a patent foramen ovale. This patency of the

foramen ovale is a comparatively frequent congenital condition, in a large proportion of cases giving rise to no subjective or even objective auscultatory symptoms and yet found at post mortem in a very large percentage of autopsies. Such an embolus is known as paradoxical embolus; by some of the German writers, the process is termed, crossed embolism. It is moreover hardly necessary to call attention to the extreme etiological importance of the presence of such a cardiac lesion in this patient, in the production of the general phlebosclerosis from which he suffers. In this case the probable site of the thrombophlebitis (the common iliac vein or possibly the inferior vena cava) would indicate that not only the superficial veins are sclerosed, but that sclerophlebitis is present in the large and deep veins, a very exceptional condition in the cases of this disease which have been reported.

Sclerosis of the veins of the body or general chronic endophlebitis, similar to although not necessarily accompanied by general arteriosclerosis, was first observed and described by Lobstein in 1835 *(Lehrbuch der Patholog. Anatomie;* Translated by Neurohr, Bd. 2, S. 514, Stuttgart, 1835). Lobstein reported a case in which there was no arteriosclerosis, in a young individual. The veins (superficial) were palpable and rigid. Sack in 1887 studied the relationship between arteriosclerosis and phlebosclerosis, ascribing both conditions to similar causes. In the etiology of sclerophlebitis, however, Sack attached much more importance to the relative position of the various veins as predisposing factors in the production of sclerotic changes, which here as in arteriosclerosis are to be considered finally as the result of disturbances in metabolism. Thus, given the nutrition disturbances, the degenerative sclerotic changes in the walls of the veins are apt to manifest themselves more frequently in veins which from their position are subjected to a maximum intravenous blood pressure. Such are the veins of the lower extremities, the femoral saphenous, popliteal, etc., the lower vena cava, the superficial veins of the arm, and very rarely in the jugulars, superior vena cava, carotid veins, and the deep veins of the arms. Veins furthermore, which are embedded in loose connective tissue are more apt to become the seat of these sclerotic changes than such as are firmly supported by the surrounding tissues. Such sclerophlebitis, however, is not a

remarkable finding in aged people, and others suffering from arteriosclerosis. Thus, C. F. Martin (*American Medicine,* 1905) found the condition present in 60 per cent. of all male patients over 65 years of age, in his service in the Montreal Hospital. But in a young man of 24 such as the patient whose history I report, without arteriosclerosis the lesion is extremely rare. The superficial veins in this patient, as partly stated in the history, feel like thick, more or less rigid, calcified cords, indeed somewhat like arteries, except that the pulsation is absent. Romberg reports that he has seen only one such case in a young man between 20 and 30 years of age, who, apart from the cord-like appearance and feel of his superficial veins, suffered from no other subjective symptoms. It may be interesting here to insert in full the excellent report of Dr. Leo Buerger of Mt. Sinai Hospital, Assistant in the Pathological Department under Dr. Mandlebaum, of the results of the gross and microscopic pathological examination of the amputated limb. It is interesting to note the clinical data so amply confirmed by the pathological facts.

PATHOLOGICAL EXAMINATION OF THE AMPUTATED LIMB.

Gross Pathology.—The extremity has been ablated at a point six inches above the adductor tubercle. The skin over the whole of the dorsum of the inner half of the foot is absent. There is a large defect over the outer aspect of the tendo Achillis. The dorsum of the foot shows a large granulating area covered with greenish fibrin and pus. The tendons are exposed, some being loosened from their insertions and hanging free. The two distal phalanges of the 2d, 3d and 4th toes are exposed, entirely devoid of periosteum and dead. The gastrocnemius muscle and tendo Achillis are exposed and cover a large collection of pus. This can be traced upward along the inner side of the knee in the cellular tissue about the femoral vessels. The internal saphenous is completely filled with dark-red thrombus. The popliteal vein is surrounded by edematous connective tissue and markedly adherent to the artery and nerve. It is also thrombosed. The posterior tibial, anterior tibial and peroneal veins show the same evidences of inflammation in their sheaths and are occluded by reddish thrombi.

Microscopic Examination.—The important changes are almost wholly confined to the veins. Some of the large arteries show the earliest lesions of arteriosclerosis or rather an endarteritis affecting only the intima.

The following veins were examined: The anterior and posterior tibial, femoral, peroneal and internal saphenous. All of these are either partly or wholly occluded by thrombi which show various stages of organization. The most important lesions common to all the veins are the endo- and meso-phlebitis. The media is infiltrated with round and spindle-shaped cells which cause a very evident separation of the muscle fibres. The most marked changes in this layer are to be found in one of the posterior tibial veins. Here but very little of the muscularis remains and a few scant fibres can be seen to be widely separated by young connective tissue rich in blood-vessels. Scattered through this coat there is considerable pigment.

The intima shows proliferation in most of the veins. The thickening of this coat is particularly marked wherever the thrombi are adherent and here there is also a production of elastic fibres. However, there are also numerous plaques which have no relation to the occluding tissue. The changes in this coat are due to a deposit of connective tissue which in parts is very dense and rich in elastic fibres, in other parts rich in cells and apparently of more recent origin.

The thrombosis in the veins has been followed by the usual type of organization. Canalization is present and differs in no way from that usually seen in the arteries.

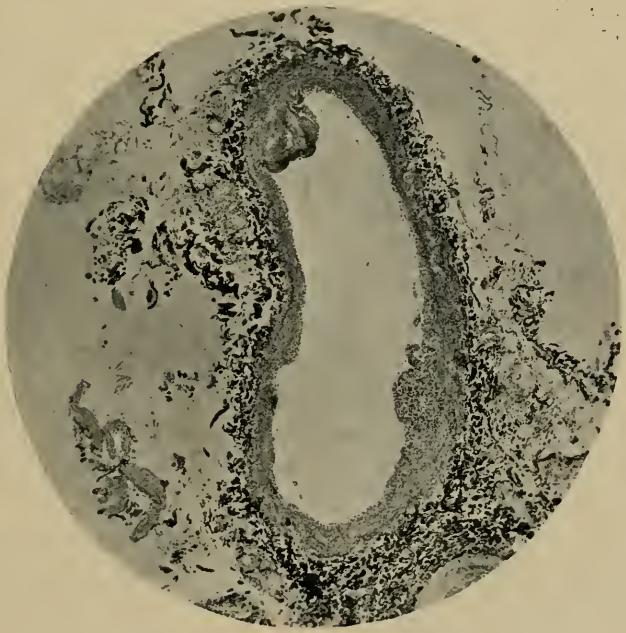
I owe to the kindness of the Director of the Pathological Laboratory, Dr. Mandlebaum, the two accompanying microphotographs of sections of the diseased veins.

We have then to deal with an endo- and meso-phlebitis of considerable duration. The lesions do not permit of any deductions as to the etiology of the process. The very marked involvement of the veins, with the comparatively healthy condition of the arteries, is of unusual interest.

It will readily be seen how important an influence, etiologically, an open foramen ovale would have in the production of such a general sclerophlebitis. It would permit the regurgitation of blood from the left auricle to the right auricle with every auricular systole, the excess of pressure being on the left side of the heart as compared with the right. The result would be a tendency to overload the venous system with an undue amount of partly arterial blood so that there would be no cyanosis in spite of the passive congestion. Such increase in intravenous pressure would result in a compensatory hypertrophy of the coats of the veins and set in action the changes resulting in the general sclerophlebitis present in this

patient. Such a sclerophlebitis would be apt to be more marked in the lower extremities in one of sedentary occupation such as that of tailor, the trade this patient follows. It is interesting too in the light of the man's occupation to trace a possible connection between the greater liability to occurrence of thrombophlebitis in the femoral and iliac veins of the left side, rather than in one of the other veins that are sclerosed, and his trade of tailor. The patient stated that he was accustomed to sit upon the table at his work in the crouched position common to men of his craft, with the left thigh undermost, thus subjecting the femoral vein of the left thigh to the greatest amount of compression traumatism. Such a thrombus would have as etiological factors the chronic phlebosclerosis, the intermittent traumatism and the slowness of the circulation in the left femoral vein, so important an element in the formation of marantic thrombi. From this point of origin it would extend along the veins toward the center until the common iliac vein was involved or even into the vena cava inferior (V. Recklinghausen: *Hand. der Allg. Pathologie des Kreislaufs; Deutsch Chirurg.*, Lief 2-3, 1883, page 127). Marantic thrombi would naturally form in all the veins emptying into the femoral vein. That our patient suffered from thrombosis of the left common iliac vein is shown by the fact that the edema and swelling and superficial dilatation of the collateral veins were marked not only in the affected leg, and particularly the thigh, but there was marked edematous infiltration of the left side of the anterior abdominal wall and loins. Indeed the slight swelling of the other leg caused us to suspect that the thrombus had extended into the vena cava, thus interfering with the return of blood from the right common iliac vein. We looked anxiously for the appearance of blood in the urine to indicate the extension of the thrombus high enough up to interfere with the venous return from the kidneys, but this symptom of a passive venous congestion of the kidneys did not occur. The urinary symptoms were at no time such as to warrant such a suspicion. Schlesinger states, however, that thrombosis of the inferior vena cava can occur and yet the edema be only present in one extremity and corresponding side of the abdomen, there being only one common iliac obstructed, the other being open and discharging its blood through the collateral circulation (H. Schlesinger:

Above and below are veins showing organized thrombi ends, and mesophlebitis ; in the middle an artery with slight endarteritis.
(Dr. Mandlebaum, Pathologist.)



Veins showing polypoid condition of the intimas.
(Dr. Mandlebaum, Pathologist)

Deutsch. Med. Wochenschrift, 1896, No. 29; *Zur Diag. der Erkrank. der V. Cava Inferior).* It was hoped in this patient that the collateral venous circulation, through the superficial vessels of the abdomen and back communicating with those of the other side and the deep superficial veins of the upper part of the thorax, would be sufficient gradually to admit of at least a partial venous return from the leg and thigh. This did really occur in the thigh; but the symptoms in the leg very soon indicated, as the history of the case has shown, that moist gangrene had set in. Amputation was delayed partly for the purpose of determining how much of the extremity would have to be removed, and partly because the patient refused his consent for amputation long after it had been determined to amputate. The operation was done by Dr. A. G. Gerster on October 20, 1906, and the following are the facts essential for our purposes in the history of the case after it had been transferred to the surgical service.

Operation October 20, 1906. Amputation of left thigh at upper third, by Dr. A. G. Gerster. Vertical incision first made at middle of thigh down to femoral artery. This was ligated and divided. A circular incision at lower end of primary incision. Periosteum elevated and pushed back. Femoral vein found completely thrombosed. Bone divided. Tube drainage. Dry dressing.

October 25: First dressing. Primary union about tube. Temperature 99.

November 5: Slight discharge through tube.

November 13: Stump healed except for one small area at previous site of tube.

November 26: Discharged cured.

Urine negative. Temperature, 99-101, rarely 102; normal at discharge.

Just before his discharge from the hospital an X-ray picture was made of portions of the lower and upper extremities on the right side, in the hope that the sclerosed veins would appear as shadows in the picture. The following is the report of Dr. W. M. Brickner, Radiographist of Mt. Sinai Hospital:

"November 23, 1906. A radiographic plate of right foot shows sclerosed vessel in front of ankle. A radiographic plate of the right arm gives a faint indication of a sclerosed vessel."

Some months after the patient's discharge from the hospital, he developed a superficial ulceration of the dorsum of the right foot, evidently due to occlusion of some superficial veins of the integument, which gradually healed.

In closing the account of this case, I may be pardoned for again calling attention to its rarity. But a few cases of general phlebosclerosis in young men have been reported in the literature, and in these cases there was generally an accompanying arteriosclerosis. Even smaller in number have been the cases of phlebosclerosis in which the arteries have been perfectly normal, as in this patient. I have not seen a single case in the literature in which a phlebosclerosis complicated by a thrombophlebitis of a large venous trunk has resulted in gangrene of an extremity, requiring amputation. Thrombosis of even large venous trunks very rarely results in gangrene of a whole extremity, owing to the fact that the collateral venous circulation very soon becomes sufficient to act vicariously, and even permanently for the occluded vessel. Obviously, owing to the general phlebosclerosis the collateral veins were hardly sufficient for their usual function, and failed to undergo the dilatation and enlargement necessary for an efficient collateral venous circulation.

A CASE OF PULSATING EMPYEMA.

By Albert Kohn, M. D.,
ADJUNCT ATTENDING PHYSICIAN.

The following case was referred to the service of Dr. Manges on November 24th, 1906:

Mrs. G. L., housewife, aged 24.

Family History.—Negative.

Previous History.—The patient had measles in childhood, and since then no acute infectious diseases. There have never been any systemic disturbances. Eighteen months ago, following exposure, she had pleurisy, lasting three weeks, and since then there has been a persistent cough. The cough is usually short and dry, but it occasionally becomes more severe, and at such times there is yellow sputum. When the cough is paroxysmal the chest feels sore; but there are no typical pleural pains. No night sweats have been observed. Seven months ago she had a second attack of pleurisy. At the time of the first attack she weighed 135 pounds. She has lost 20 pounds since then. She went to the country, but did not pick up, although her appetite remained fair.

Her menstrual history was normal until a year ago, when she ceased to have her periods, although she has not been pregnant.

Present Illness.—Her present illness is of four weeks duration, and gradual onset. There was sharp, sticking pain in the lower dorsal spine and left chest. Although there have been no chills and fever she has had profuse sweats throughout the illness.

Two weeks ago the pain in the left chest grew worse; and a week later it became excruciatingly tender to the lightest pressure. No pulsation of the chest was observed, although it felt heavy. There was a slight cough with little expectoration until twenty-four hours ago, when she began to cough excessively, bringing up large quantities of dirty yellow sputum. The breathing is shallow. There is loss of flesh and strength.

PHYSICAL EXAMINATION, NOVEMBER 24, 1906.

General Condition.—General condition poor, anemic. Clubbing of fingers and incurvation of nails present. Lumbar spine more prominent than dorsal. Patient is emaciated.

Glands.—Some enlargement of axillary, inguinal and epitrochlear glands.

Nose, Ears and Mastoids, Eyes, Thyroid and Mammary Glands, Bones and Joints.—Negative.

Mouth.—Lips and gums moderately cyanosed. Tongue moist, and slightly coated. There is a small ulcer on the frenum. Throat is red. Otherwise negative.

CHEST.

(1) INSPECTION.

Anteriorly.—There is marked retraction in supra- and infraclavicular spaces, more so on right side. Pulsation of the cervical vessels to the extreme right of the right infraclavicular space, and in the right third space from the sternum to the nipple line; also over ensiform cartilage.

Anteriorly.

Right side:	*Left side:*
Pulsation in 3d space from sternum to nipple line. Less marked in 2d space. Also in outer third of 1st space.	No pulsation.

Axillæ.

No pulsation.	From the level of angle of scapula down for three inches, and between vertical lines through angle of scapula (when arm is flat against chest) and posterior axillary line, is a bulging mass seen to pulsate synchronously with the apical systole of the heart.

Posteriorly.

Interscapular region is prominent, becoming more so on inspiration.	Left interscapular region bulges; there is obliteration of the intercostal spaces, and immobility of the ribs. Pulsation is present, synchronously with the heart, more marked below than above the level of the angle of the scapula.

(2) Palpation.

	Anteriorly.
Pulsation marked in area bounded by 2d space, sternum and nipple line, extending down to and merging into the pulsation of the epigastrium.	Slight pulsation from 3d rib down, becoming more marked below and also merging into epigastric pulsation. It is bounded without by the nipple line. It is most marked in nipple line, 5th space, and over the xiphoid.
	Posteriorly.
There is a sense of retraction in the intercostal spaces.	Supra spinous space: diminished motion as compared with right side. There is a sense of bulging between ribs. This is felt to pulsate, and the pulsation is clearer as the hand passes over the bulging described above, posterior to the left axilla.

(3) Tactile Fremitus.

	Anteriorly.
Present and exaggerated.	Present in 1st, 2d, and 3d spaces. Absent in 4th space. Absent in axilla.
	Posteriorly.
Present, 7th cervical and 1st dorsal. Exaggerated from 2d to 5th dorsal vertebræ levels.	Present, 7th cervical and 1st dorsal. 2d dorsal diminished: 3d dorsal more diminished; 4th dorsal almost gone. 5th dorsal to base, absent.

(4) Percussion.

	Anteriorly.
(a) Supraclavicular area: dull tympany.	*(a)* Supraclavicular area: dull tympany; rather more dull than tympanitic.
(b) Infraclavicular area: dull exaggerated note; tendency to tympany.	*(b)* Flat, tympany.
(c) 2d space, tympanitic.	*(c)* Flat, tympany.
(d) 2d space downward; a gradually fading tympanitic note first becoming dull, then flat, and merging into liver flatness.	*(d)* From 3d rib down note changes, becoming flat, and losing the tympanitic quality heard above.

Posteriorly.

Tympany of right side.	Dull tympany in supraspinous region, merging into flatness below.

Axillæ.

Tympany to liver.	Flat.

(5) AUSCULTATION.

Anteriorly.

(a) Supraclavicular fossa: rough breathing.	*(a)* Diminished breathing. At end of inspiration large, dry râles.
(b) Infraclavicular fossa: rough breathing, fine subcrepitant râles.	*(b)* Breathing diminished toward outer side; bronchial toward sternum.
(c) 2d space: breathing less rough. More râles at end of inspiration.	*(c)* Bronchial toward sternum; diminished breathing externally.
(d) 3d space: breathing less intense, still rough. Fewer râles.	*(d)* Breathing faint; not bronchial.
(e) 4th space: breathing still fainter; fewer râles. Heart sounds clearly heard, particularly below and toward sternum.	*(e)* Absent breathing. Heart sounds faint; clearest at 2d space near sternum.

Axillæ.

High up, rough inspiration accompanied by râles. Toward liver, breath sounds fainter and râles absent.	Breath sounds absent below, faint above.

Posteriorly.

(a) Suprascapular fossa: rough inspiration, slightly bronchial.	*(a)* Diminished breathing. Râles with inspiration.
(b) Interscapular space: over scapula, breathing slightly bronchial. Below, breathing is rough.	*(b)* Breathing diminished, particularly over scapula. Below, faint inspiration, no expiration.

(6) VOICE SOUNDS.

Posteriorly.

(a) Supraspinous fossa to level of 2d dorsal vertebra, exaggerated.	*(a)* Present.
(b) 2d dorsal vertebra to angle of scapula, diminished.	*(b)* The same.
(c) At angle of scapula voice is present, but rough.	*(c)* Absent at angle of scapula.

Anteriorly.

(a) Above clavicle: increased.	*(a)* Diminished.
(b) Increased to 3d space.	*(b)* More markedly diminished from 2d to 4th space.
(c) 5th space diminished.	*(c)* More diminished in 4th space.
(d) 6th space absent.	*(d)* Absent from 4th space down.

HEART.

Right Border—In 1st space—4.5 cm. to right of mid sternal line.
In 2d space—6. cm. to right of mid sternal line.
In 3d space—7.5 cm. to right of mid sternal line.
In 4th space—9. cm. to right of mid sternal line.
Left Border—In 1st space—1.75 cm. from mid sternal line.
In 2d space—2.75 cm. to left of mid sternal line.
Not made out in other spaces on account of the dullness.

Maximum cardiac impulse is heard to the right of the middle line and in epigastrium.

Action.—Rapid, regular and forcible.

Sounds.—First and second are loud in the epigastrium and also to the right of the mid sternal line. In fourth space to the right of the sternum a systolic impurity accompanies first sound which is also heard in the second and third spaces to the right of the sternum. A systolic pleuro-pericardial sound is also heard over the right second and third spaces (right border of heart). A short systolic murmur is heard in the vessels of the neck. Vessels are distended.

Pulses.—Pulses are unequal (the right is larger than the left); there is slight sclerosis, no increased tension, marked pulsus paradoxus, fair quality and regular. There is slight distention of superficial veins of upper extremities, and the veins fill up very rapidly. This distention of veins is very much exaggerated on the right side by pressure just below and to the inner side of the coracoid process. But there is no positive venous pulsation.

Circumferences of Chest.—	*Right.*	*Left.*
Through 2d rib in front and 7th dorsal spine,	40.5 cm.	39. cm.
Through 4th rib in front and 10th dorsal spine,	41. cm.	43. cm.
Through tip of xiphoid in front and 1st lumbar spine,	38. cm.	39. cm.

Liver.—Upper border not definitely made out; there is dullness in the third space in the mid clavicular line, down to free border. Free border is palpable and can be ballotted 11 cm. below free border in mammary line. It is also palpable in the mid line until it meets the free border of the ribs in the left mammary line; not tender.

Spleen.—Indefinitely palpable below free border.

Abdomen.—Prominent, especially about the umbilicus. The umbilicus is pointing. The umbilical ring shows slight weakness; there is an impulse on coughing. No diastasis recti. Lax, generally tympanitic; tympany in flanks. No fluid wave; no masses, no tenderness. Veins in lower half of abdomen on each side and upper part of thigh quite prominent.

Extremities.—No edema. Knee jerks present. Plantars active.

November 27.—Sputum blood-streaked. Tubercle bacilli found.

November 29.—Aspiration of left chest. Pus obtained.

November 30.—Expectorating thick, green pus.

December 1.—Bulging in chest more distinct.

December 2.—Pathologists report streptococci in fluid, and a few polynuclears and disintegrated pus cells.

December 5.—No succussion or coin-test.

December 6.—No material changes in physical signs, except that pulsation in left axilla is almost gone, after patient has expectorated a large amount of pus. Signs of pneumothorax.

December 16.—Return of pulsation in left axilla.

LOCAL EXAMINATION.

INSPECTION.—Dec. 27.

Right chest:	*Left chest:*
	Pulsation in axilla not present. Present in scapular line in 8th and 9th spaces.
PERCUSSION.—	
Hyperresonant note over whole chest.	Dull tympany above left clavicle and 2d and 3d spaces in front; also high in left axilla. Flat below.
AUSCULTATION.—	
Dry râles over entire right chest.	Broncho - vesicular breathing above and below left clavicle. It is distant and accompanied by small and medium moist râles. Bronchial over inner half of 1st space. Over rest of left lung in front a few sticky râles.
	In upper left axilla there is diminished breathing with creaking sounds. Diminished below, and absent breathing in lower half of axilla.
Posteriorly, increased breathing over lung.	Posteriorly, distant bronchial breathing at left apex. Absent breathing below.

December 28.—Pulsation is again present. Amphoric breathing in second and third space to left of sternum. Coin-test and succussion here present. Coin-test only when coin is in left interscapular region just within scapula.

January 5, 1907.—Transferred to Tuberculosis Ward.

January 8.—After two sudden attacks of dyspnea the patient died.

TEMPERATURE, PULSE AND RESPIRATION.

1st Week: T., Irregular septic course from 98° to 103°.
P., 110-140; average, 125.
R., 26-48.

2d Week: T., 98°-101°. Irregular; not septic.
P. and R. unchanged.

3d Week: T., First three days 98.4°-100°.
Four latter days 98.6°-102°.
P. and R. as above.

4th Week: T., First day 98.8°-102°;
Other six days, low grade, septic daily, 99°-102°.
P. and R. as above.

5th Week: T., 99°-100°.
P., 100-110.
R., 26-32.

6th Week: T., 99°-99.8°; second day to 100.8°; sixth day to 101.4°.
P., 128-136.
R., 28-36.

7th Week: T., First three days 97°-100°.

Died with T., 100°.
P., 128.
R., 56.

Urine.—Dark amber, turbid. Fourteen examinations: Acid; (once alkaline, once neutral). Average Sp. Gr. (16-30), 23. Faint trace of, or no, albumin. Usually a few epithelial cells, occasional leucocytes; very occasional hyalin and granular casts, and cylindroids. No erythrocytes, indican, bile, sugar, acetone or diacetic acid.

Blood Examinations.—Nov. 24, W. B. C. 20,600. Hg. 60 per cent. Differential count:

Polynuclears	84
Small lymphocytes	4
Large "	11
Mononuclears	1
	100 counted

November 28.—Hg. 45 per cent.

December 3.—W. B. C. 11,000.

Autopsy not permitted.

In 1893 Wilson,[1] in conjunction with Eschner, collected from medical literature 65 cases of pulsating empyema, and at the same time reported three of his own, making a total of 68. The first case dated back to Baillou in 1640 (Paris).

In 1903 Henry[2] reported 15 cases, 4 of which were published before Wilson's paper, and the remainder after it. In this publication Henry describes a case of his own. Sailer,[3] in 1904, brought the list up to 97. Since then, five cases have been described by Lavierato, (2), Cole (2), and McDowell (1); so that, roughly speaking, we may place the number of cases thus far reported at about 100.

Considering the number of cases of empyema and pyopneumothorax constantly encountered, it seems strange that the conditions favoring pulsation should not more often obtain. Again, the cases described vary considerably as to the areas of pulsation; varying from one or more pulsating tumors to a general thoracic pulsation. The theories advanced to explain the etiology are also many and varied, leaving no doubt that the correct cause has not yet been proven.

The three cases described by Wilson are, briefly, as follows: The first followed a strain in lifting, with pain, serous effusion, and finally pus. There was extensive pulsation of the left side. The second was in a case of croupous pneumonia of the left side, with considerable pain; a month later there appeared a large effusion with pulsation over the lower bulging intercostal spaces, perceptible to sight and touch. The third was a case of influenza followed by pulmonary tuberculosis, a large left-sided effusion with pneumothorax. There was distinct pulsation of the chest in the third, fourth, fifth and sixth spaces on the left side extending to the line of the anterior axillary fold. Henry's case was in a female presenting three strongly pulsating tumors of the left chest: one in the mammary region, rather large; a second, smaller, in the antero-lateral region (eighth intercostal space); and a third, the largest, in the postero-inferior region, its long diameter four inches in length. These tumors all presented systolic expansile pulsation. Palpating the large anterior tumor gave the feel of fluid and air contents with splashing. Dr. Sailer's case, although mentioned in his paper, was not an empyema, but a hemothorax

[1] Transactions of Association of American Physicians.
[2] New York Medical Journal.
[3] American Journal of Medical Sciences.

with expansile pulsation over the left chest, the autopsy showing a ruptured aneurism of the ascending and transverse portion of the arch. Of Cole's cases the first had flatness and bulging over the entire left chest below the clavicle, with the impulse in the third and fourth interspaces to right of sternum. The front and axillary portions of the left chest showed visible pulsations systolic in time. The second case showed a definite area of pulsation in the third and fourth interspaces outside the mammillary line, tracings being systolic in time. McDowell's case presented a swelling to the right of the sternum between nipple and tip of sternum, which conducted no voice, was dull, and beat synchronously with the heart. It was right-sided and complicated pneumonia.

Abstracts of the other cases are cited in the articles above mentioned.

A survey of the cases reported shows the following:

1. The condition occurs more frequently in males than in females, in the proportion of three to one.
2. The majority of cases occurred under 30 years of age, while no case has been reported over 60 years of age.
3. The favorite site is on the left chest, 90 per cent. at least having been found on this side.
4. The cases with tumor formation are slightly in excess of those with general pulsation. These tumors were in greatest number at the sites of the costal cartilages; the next favorite spot was the pericardium; and the next from the angle of the scapula downwards.
5. Most of these cases have been associated with tuberculosis.
6. Many of the cases had present the typical signs of pneumothorax.
7. Regarding prognosis, no definite statement can be made. Wilson, however, states that there were 24 recoveries to 22 deaths.

The theories as to the nature and cause of pulsating collections of fluid are almost as many as the reported cases. *Wilson* makes four factors essential:

1. Some degree of paresis of the intercostal muscles.
2. Local necrosis and perforation of the parietal pleura.
3. Latent or manifest pneumothorax.
4. Atelectatic condition of the lung in whole or in part, the left lung being in relation to and adherent to the pericardium.

Traube considers the necessary feature a pericardial exudate, there being a violent cardiac action and waves transmitted through effusion. This pathological condition has, however, not been proven. *Féréol* makes a pneumothorax essential with confined air as the transmitting agent. This, he held, may, however, be latent from the presence of a large effusion, the air being forced backward toward the root of the lung. If no communication exists with the outside through the border, an air cushion is formed which conveys pulsation to the fluid.

Lépine makes the conditions these:

1. Complete lung compression; or else the beats will be absorbed.
2. Mediastinal rigidity; or the waves will be delivered to the sound lung.
3. Tense diaphragm; but yet not too dense to convey pulsations outward.

Henry's factors are:

1. Large and left-sided effusion.
2. Relaxation of thoracic wall from paresis of intercostal muscles.
3. A somewhat forcible heart beat.

Many of the conditions described by authors as necessary to pulsation may be criticised from the view-point of other cases in which these conditions did not exist. The first requisite that must apparently obtain is a tension of the pleural exudate. Yet, while in most cases aspiration of the fluid abolished pulsation, this has been by no means without exception; and it has been noted to first appear *after* aspiration. The nature of the fluid certainly has no bearing, for pulsation has appeared not only with pus, but with serum, blood, and even in solid tumors of the lung.

Pericarditis, either with or without pericardial exudate, has not been demonstrated often enough to make this an absolute factor. Increased violence of heart action and simple transmission would mean a greater frequency of the condition than now exists.

The presence of air has not been proven often enough to make it an essential. It would seem, however, that a fixation of the mediastinal organs might justly be assumed as necessary; and this through the presence of adhesions, though not invariably pericardial. A localized weakening of the chest wall would be essential to the forma-

tion of a pulsating tumor. Tension, by fixation of the structures surrounding the fluid, must exist up to a certain point, or there would be no transmission.

The theories which have been carried further have mostly been based upon pathological changes existing in only some of the cases, or upon experimental work disproved in other cases. Calvert has recently investigated this subject as follows:

He introduced a canula connected to a mercury manometer into the right carotid. He filled, under varying pressures, the pericardium with salt solution, and measured the intrapericardial pressure and pulsations. Comparing the pulse with the pericardial pulsation, he found that the pulse curve rose as the pericardial curve fell, and vice versa. The diastolic pulsation of the pericardium is caused by the diminution in the size of the heart during systole, as a portion of the blood leaving the left ventricle is expelled from the thorax and not counterbalanced by that entering. If therefore a pulsation occurs it should be diastolic, as occurs in the pericardium. But as Calvert in a previous work has demonstrated by cross-sections through the thorax the intimate relation of the pleura to the aorta, therefore pulsation, if systolic, must be attributed to the aorta. This claim appears to us in error, for we can readily see how, even with a pericardial pulsation which is diastolic in time, we may have an impulse which is systolic. In other words, just as the apex projects against the anterior chest during systole, in spite of the contraction of the heart area, so an impulse from the twisting of the heart may be carried along and felt at the chest surface. Reviewing the characteristics of our case, we would do so as follows:

A case of tuberculosis, complicated by empyema. This empyema accompanied by both a general and a localized pulsation, the latter forming a distinct tumor about three inches in diameter. A secondary pulsation on right side and epigastrium due directly to the heart action. A displaced heart. A pneumothorax which developed while the patient was under observation, and after all the various signs of pulsation were in existence, due to rupture of the empyema through a bronchus. Pulsation not influenced by aspiration. Signs of pericardial adhesion. The case is characteristic in all respects, and it is to be regretted that autopsy was not permitted.

CASE OF PULSATING EMPYEMA

STATISTICAL REPORT CHILDREN'S SERVICE, 1905.

ATTENDING PHYSICIAN,
HENRY KOPLIK, M.D.

ADJUNCT ATTENDING PHYSICIAN,
HENRY HEIMAN, M.D.

	Male				Female				
	Cured.	Improved.	Unimproved.	Died.	Cured.	Improved.	Unimproved.	Died.	Total.
Specific Infectious Diseases.									
Diphtheria (bacteriological)	1	..	..	..	..	..	..	..	1
" Post scarlatinal, pneumonia and nephritis	2	..	..	..	1	..	1	..	4
Dysentery (Shiga)	1	..	..	..	..	..	..	..	1
Malaria	..	..	..	..	1	..	..	..	1
Measles with empyema sinus	1	..	..	..	..	..	..	..	1
Meningitis (cerebro-spinal)	6	..	1	10	9	1	2	12	41
" " " with double sciatic neuritis	1	..	..	..	..	..	..	..	1
" (cerebro-spinal with permanent deafness)	1	..	..	..	..	..	..	..	1
" (cerebro-spinal with diphtheria)	..	..	..	..	2	..	..	..	2
" (" " " varicella)	1	..	..	..	..	1	..	..	2
" (streptococcic)	..	..	..	1	..	..	..	..	1
" (septic)	..	..	..	1	..	..	..	..	1
" (tuberculous)	..	..	..	11	..	..	..	4	15
Multiple pyocyaneous abscesses	..	..	..	..	..	..	..	1	1
Paratyphoid with pyelitis	..	..	..	..	1	..	..	..	1
Parotitis, infectious	..	..	..	..	..	..	1	..	1
Rheumatism, acute articular	1	..	..	..	..	..	..	..	1
Tonsillitis	..	..	1	..	..	..	..	..	1
Typhoid fever, uncomplicated	7	..	..	..	4	..	..	1	12
" " with mastoiditis	..	1	..	1	..	..	..	..	2
" " " myocarditis	1	..	..	..	..	..	..	..	1
" " " pertussis	..	..	..	..	..	..	1	..	1
Syphilitic osteomyelitis	1	..	..	..	..	..	..	..	1
Rheumatism, acute articular (with endocarditis)	..	..	..	..	..	2	..	..	2
	24	1	2	24	18	4	5	18	96
Respiratory System.									
Bronchiectasis	..	1	1	..	..	..	..	..	2
Bronchitis, acute	..	1	..	..	..	..	..	..	1
Empyema	9	1	1	..	1	..	..	..	12

Respiratory System—*(Continued).*	Male				Female				Total.
	Cured.	Improved.	Unimproved.	Died.	Cured.	Improved.	Unimproved.	Died.	
Empyema double	..	..	..	..	1	..	..	..	1
" with double mastoiditis	1	..	..	..	..	..	..	..	1
" " " ileo colitis	1	..	..	..	..	..	..	..	1
" (streptococcus)	..	..	..	..	..	..	..	1	1
Laryngismus stridulus	..	..	..	..	..	..	1	..	1
Pneumonia, acute broncho	8	..	..	5	3	..	..	2	18
broncho, double									
" broncho with empyema	..	1	..	..	1	..	..	..	2
" " " enteritis	..	..	..	1	1	..	..	1	3
" " " ileo colitis	..	..	..	..	..	..	..	..	...
" " " congenital	..	..	..	..	..	..	..	..	...
stridor	..	..	..	1	1	..	..	..	2
" " " mastoiditis	..	..	..	..	1	1	..	..	2
" " " measles	2	..	..	..	..	..	..	..	2
" " " nephritis and empyema.	1	..	..	..	..	..	..	..	1
" " " pertussis	..	..	1	..	..	..	..	..	1
" " " rickets	2	..	..	..	1	..	..	1	4
" " " otitis media	..	..	..	..	1	..	..	..	1
" " " rickets, laryngismus stridulus	1	..	..	..	..	..	..	..	..1
" " " (purulent)		1	..	..	..	..	..	..	1
Tubercular broncho-pneumonia with meningitis...	..	..	..	1	..	..	..	..	1
Pneumonia (influenza)	10	1	..	..	2	..	..	..	13
" " with pleurisy	..	..	..	..	1	..	..	..	1
" lobar	11	..	..	1	7	..	..	1	20
" " (double)	..	..	..	..	1	..	..	..	1
" " with empyema	..	..	..	1	1	..	..	..	2
" " " meningism	1	..	..	..	..	..	..	..	1
" " " otitis media	1	..	..	..	..	..	..	..	..1
" " " pleurisy	..	..	..	..	1	..	..	..	1
" " " " with effusion	2	..	..	..	..	..	..	..	2
" sub-acute	..	..	..	..	1	..	..	..	1
" tubercular and hydropneumothorax..	..	1	..	..	..	..	..	..	1
Pleurisy	1	..	..	..	..	..	..	..	1
" sub-acute	1	..	..	..	..	..	..	..	1
" with effusion	4	..	..	..	1	..	..	..	5
	56	7	3	10	26	1	1	6	110
Circulatory System.									
Endocarditis, chronic	..	8	1	1	..	8	2	4	24
" " with acute follicular tonsillitis	..	..	..	..	..	1	..	..	1
" " with lobar pneumonia	..	..	..	1	..	..	..	..	1
" congenital	..	..	..	..	..	1	..	..	1
" chronic with nephritis	..	..	..	..	..	..	..	1	1
" " pharnygeal diphtheria	..	1	..	..	..	..	..	..	1

	Male				Female				
Circulatory System—*(Continued).*	Cured.	Improved.	Unimproved.	Died.	Cured.	Improved.	Unimproved.	Died.	Total.
Endocartitis chronic with pericarditis	..	1	..	1	..	2	..	..	4
" " " pulmonary infarct	..	1	..	..	..	..	..	..	1
" " " rheumatism	..	2	..	1	..	1	..	..	4
" " " rheumatism, sub-acute	..	..	..	..	..	2	..	..	2
" septic with cerebral embolism	..	..	..	..	..	..	..	1	1
" " " " " and hemiplegia	..	..	..	..	..	..	..	1	1
	..	13	1	4	0	15	2	7	42
Nervous System.									
Amaurotic family idiocy with broncho-pneumonia	..	..	..	1	..	..	..	..	1
Angio-neurotic edema	1	..	..	..	1	..	..	..	2
Anterior poliomyelitis	1	2	..	..	..	..	..	..	3
Brain tumor	..	..	1	..	..	1	1	..	3
Chorea minor	4	4	..	..	4	9	..	..	21
" " with diphtheria	1	..	..	..	..	..	..	..	1
" " acute follicular tonsillitis	1	..	..	..	..	..	..	..	1
" epilepsy	..	1	1	..	..	..	..	..	2
Contractures, hysterical	..	..	..	..	..	..	1	..	1
Convulsions following broncho-pneumonia	..	..	..	1	..	..	..	..	1
Ependymitis, chronic	..	..	..	..	..	..	..	1	1
Hydrocephalus, chronic	..	..	..	1	..	..	..	..	1
" congenital	..	..	..	1	..	2	1	..	4
" external	..	..	1	..	..	..	..	..	1
Hysteria	..	..	..	..	1	..	..	..	1
Infantile atrophy	..	..	..	..	..	1	..	..	1
Mongolian idiocy with broncho-pneumonia	..	..	..	1	..	..	..	..	1
Meningo-encephalitis	..	..	..	..	..	..	2	..	2
Paralysis, acute ascending (Landry's)	..	..	..	1	..	..	..	..	1
Palsy, cerebral, with congenital stridor of larynx and acute tonsillitis	..	..	1	..	..	..	..	..	1
	8	7	4	6	6	13	5	1	50
Diseases of the Blood									
Anemia (Von Jaksch')	..	1	..	..	..	..	..	..	1
Hodgkin's	..	1	..	..	..	..	..	..	1
Leukemia, acute lymphatic	..	..	..	2	..	..	..	..	2
Purpura (Henoch's)	1	..	..	..	..	1	..	..	2
Scurvy, infantile	..	..	..	..	1	..	..	..	1
	1	2	..	2	1	1	..	..	7

	Male				Female				
	Cured.	Improved.	Unimproved.	Died.	Cured.	Improved.	Unimproved.	Died.	Total.
Gastro-enteric Tract.									
Autointoxication (intestinal)	1	..	..	..	2	..	..	..	3
Appendicitis, sub-acute	..	..	..	..	1	..	.	.	1
Cholera Infantum	..	..	..	..	..	..	..	1	1
Dysentery	..	..	..	..	..	..	..	1	1
Enteritis	3	..	..	1	4	..	..	1	9
Feeding	..	..	..	..	2	..	..	..	2
Gastro-enteritis	1	1	1	..	2	..	..	..	5
" " (chronic)	..	..	..	1	..	..	..	..	1
Hepatic neoplasm	..	..	..	..	..	..	..	1	1
Hernia (Incipient right inguinal)	..	..	..	..	..	..	1	..	1
Ileo-colitis	..	..	..	..	1	..	..	..	1
Indigestion, acute	..	..	..	..	1	..	..	..	1
Jaundice (acute catarrhal)	..	1	..	..	..	..	..	..	1
Peritonitis, tubercular	..	1	..	..	..	..	..	..	1
	5	3	1	2	13	..	1	4	29
Kidneys and Genito-Urinary System.									
Kidney (sarcoma of) with internal hemorrhage	..	..	..	..	..	..	..	..	1
Nephritis, chronic	..	3	..	..	..	..	..	..	3
" acute diffuse	..	1	..	..	..	..	..	..	1
" chronic diffuse	..	..	..	..	..	1	..	..	1
" " " with Edebohl's operation	..	2	..	..	..	..	..	..	2
" (post diphtheritic) and myocarditis	..	1	..	..	..	..	..	..	1
Vulvo-vaginitis (gonorrheal)	..	..	..	..	..	..	1	..	1
Extrophy of bladder	..	..	1	..	..	..	..	..	1
	..	7	1	1	..	1	1	..	11
Constitutional Diseases.									
Rickets with adenoids	1	..	..	..	..	..	..	..	1
	1	..	..	..	..	..	..	..	1
Skin Diseases.									
Sclerema	1	..	..	..	..	..	..	..	1
Multiple pigmented moles	..	..	..	..	..	1	..	..	1
Keratosis follicularis	..	..	..	..	..	1	..	..	1
	1	..	..	..	..	2	..	..	3

Unclassified Diseases.	Male				Female				Total.
	Cured.	Improved.	Unimproved.	Died.	Cured.	Improved.	Unimproved.	Died.	
Achondro-dystrophia fetalis	..	..	1	..	..	..	..	..	1
Atrophia infantilis	1	..	..	..	..	..	..	..	1
Gonitis, tubercular	..	..	..	..	..	..	1	..	1
Congenitally weak new-born	..	..	..	..	1	..	..	..	1
Marasmus	..	..	..	..	..	..	..	1	1
Retropharyngeal abscess and serous meningitis	..	..	..	..	..	..	..	1	1
Sarcoma of superior maxilla	..	..	..	1	..	..	..	..	1
Status febrilis	..	..	..	..	..	..	1	..	1
Sub-acute rheumatism	..	..	..	..	..	1	..	..	1
	1	..	1	1	1	1	2	2	9

STATISTICAL REPORT CHILDREN'S SERVICE, 1906

ATTENDING PHYSICIAN,
DR. H. KOPLIK.

ADJUNCT ATTENDING PHYSICIAN,
DR. H. HEIMAN.

	Male		Female		
	Disch'd.	Died.	Disch'd.	Died.	Total.
Specific Infectious Diseases.					
Diphtheria	..	..	..	1	1
" with acute endocarditis	..	..	1	..	1
" " sub-maxillary abscess	1	..	..	..	1
Influenza with lobar pneumonia	1	..	..	..	1
Measles with cerebro-spinal meningitis	1	1	..	..	2
" " broncho-pneumonia	2	1	..	..	3
" " pleurisy with effusion	1	..	..	..	1
Meningitis, epidemic cerebro-spinal	9	16	12	3	40
" epidemic cerebro-spinal with gonorrheal vaginitis	..	..	1	..	1
" septic	..	1	..	..	1
" tubercular	..	10	..	20	30
" chronic cerebro-spinal	1	1	1	..	3
" chronic cerebro-spinal with internal hydrocephalus	2	..	2	..	4
" chronic cerebro-spinal with hydrocephalus and encephalitis	1	..	..	2	3
Peritonitis, tubercular	1	1	2	..	4
Syphilis, tertiary	..	..	1	..	1
Tuberculosis, acute general miliary	..	1	..	..	1
Typhoid fever	9	1	9	2	21
" " with recrudescence	2	..	..	..	2
" " " relapse	2	..	..	..	2
" " " perforation	..	1	..	..	1
" " " broncho-pneumonia	2	..	1	..	3
" " " chronic otitis media purulenta	1	..	..	..	1
" " " periostitis of jaw	1	..	1	..	2
Varicella with empyema	..	..	..	1	1
" " chronic meningitis	..	..	..	1	1
" " streptococcemia	..	1	..	..	1
	37	35	31	30	133
Respiratory System.					
Bronchiectasis	..	1	..	..	1
Bronchitis, acute	3	..	1	..	4
" " with rickets	1	..	..	..	1

	Male		Female		
Respiratory System—*(Continued).*	Di.ch'd.	Died.	Disch'd.	Died.	Total.
Adenoids	1	..	..	..	1
Empyema	6	1	3	2	12
Pneumonia, acute broncho	27	10	15	6	58
" " " with empyema	4	..	1	..	5
" " " pleurisy with effusion	1	..	..	..	1
" " " entero-colitis	2	4	3	2	11
" " " otitis media	..	1	..	..	1
" " " endocarditis	..	1	..	..	1
" " " pericarditis with effusion	..	1	..	..	1
" " " rickets	..	..	..	1	1
" " " atrophia infantilis	1	..	..	..	1
" persistent broncho	1	..	3	..	4
" lobar	12	..	9	2	23
" " with empyema	2	..	..	..	2
" " " enteritis	..	..	1	..	1
" " " pericarditis with effusion	..	..	..	1	1
" " " pleurisy	..	..	1	..	1
" " " meningism	..	..	1	..	1
Sarcoma of lung, metastatic	1	..	..	..	1
	62	19	38	14	133
Circulatory System.					
Endocarditis, acute	1	..	..	1	2
" " with acute rheumatism	..	1	..	..	1
" " " pleurisy with effusion	..	..	1	..	1
" sub-acute	..	..	1	..	1
" chronic	6	..	4	..	10
" " with acute exacerbation	..	..	1	..	1
" " " " pericarditis with effusion.	..	1	1	1	3
" " " " articular rheumatism	7	1	3	1	12
" " " nephritis and acute pericarditis.	..	1	..	..	1
" " " pneumonia and pleurisy with effusion	1	..	..	..	1
" " " uremia	..	..	1	..	1
" congenital with broncho-pneumonia	..	..	1	..	1
Pericarditis with effusion	2	..	..	..	2
Peri-endocarditis, chronic	1	2	1	..	4
" " " with pneumonia	..	1	..	..	1
	18	7	14	3	42
Nervous System.					
Angio-neurotic edema	1	..	..	..	1
Anterior poliomyelitis, acute	1	..	2	..	3
" " " with impetigo contagiosa	..	..	1	..	1
Cerebellar tumor	..	..	1	..	1

	Male		Female		
Nervous System—*(Continued).*	Disch'd.	Died.	Disch'd.	Died.	Total.
Cerebral tumor	..	..	1	..	1
Chorea minor	8	..	15	..	23
" " with chronic endocarditis	3	..	..	..	3
" " " " " and pericarditis	..	1	..	..	1
Epilepsy, idiopathic	..	..	1	..	1
Hydrocephalus, internal	3	1	..	1	5
Little's disease	1	..	..	..	1
Microcephalus	..	2	..	..	2
Mongolian idiocy with broncho-pneumonia	1	..	..	..	1
Spina bifida occulta with paraplegia	..	..	1	..	1
Chorea paralytica with aphasia	..	..	1	..	1
	18	4	23	1	46
Blood Diseases.					
Anemia, pernicious	..	..	1	..	1
Hemophilia	2	..	..	..	2
Henoch's purpura	1	..	..	..	1
" " with parenchymatous nephritis	..	..	1	..	1
Hodgkin's	1	..	1	..	2
Leukemia, acute	1	1	1	..	3
" " lymphatic with capillary bronchitis	..	1	..	..	1
Lympho-sarcoma	..	1	..	..	1
Scorbutus	..	..	2	..	2
Splenomegaly, primary	..	..	1	..	1
	5	3	7	..	15
Gastro-enteric Tract.					
Autointoxication	4	..	3	..	7
" with migraine	..	..	1	..	1
" " polioencephalitis	1	..	..	..	1
Congential hypertrophy of pylorus	1	..	..	..	
Enteritis, acute	8	7	7	9	31
" " with scalp furunculosis	..	..	1	..	1
" " " parotitis	1	..	..	..	1
" chronic catarrhal	..	..	1	..	1
Gastro-enteritis	1	2	..	1	4
" " with rickets	1	..	1	..	2
Intestinal intoxication	1	..	1	..	2
Omphalitis	1	..	..	..	1
	19	9	15	10	53
Liver.					
Cirrhosis	1	..	..	..	1

	Male		Female		
	Disch'd.	Died.	Disch'd.	Died.	Total.
Kidneys, Etc.					
Nephritis, sub-acute	3	..	1	..	4
" chronic	1	..	1	..	2
" " with uremia	1	..	..	..	1
" purulent	..	..	..	1	1
Eclampsia, infantile	1	..	..	..	1
Urethral calculus	1	..	..	..	1
Urethritis, gonorrheal	1	..	..	..	1
Vulvo-vaginitis	..	..	1	..	1
	8	..	3	1	12
Unclassified.					
Achondroplasia with acute broncho-pneumonia	1	..	..	..	1
Atrophia infantilis	1	..	1	..	2
Dactylitis, tubercular	1	..	..	1	2
Erythema nodosum	1	..	..	..	1
Furunculosis	1	..	..	..	1
Granuloma, tubercular	1	..	..	..	1
Hypermetropia	1	..	2	..	3
Mastoiditis	..	..	1	1	2
" with retropharyngeal abscess and sepsis	..	1	..	..	1
Panophthalmitis	..	..	1	1	2
Peritonitis, purulent	..	2	..	..	2
Sarcoma of thigh, acute	..	..	..	1	1
Sepsis neonatorum	..	..	..	1	1
Sub-acute articular rheumatism	2	..	..	..	2
Marasmus	..	..	1	1	2
Pott's disease	..	..	1	..	1
Rickets with retropharyngeal abscess	..	..	..	3	3
" " latent tertiary and laryngismus stridulus	1	..	..	..	1
" " Little's disease	..	1	..	..	1
Torticollis	1	..	..	..	1
	11	4	7	9	31

THE TECHNICS OF LUMBAR PUNCTURE IN CHILDREN: WITH PARTICULAR REFERENCE TO THE PRESSURE OF THE CEREBROSPINAL FLUID.*

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The publication in 1891 of Quincke's masterly work on lumbar puncture marks the beginning of an era in which this operation, both as a frequent diagnostic aid and an occasional therapeutical expedient, has steadily extended in field of usefulness. Originally suggested to Quincke by the fact that an older operation—that of tapping the ventricles for the relief of excessive intracranial pressure in hydrocephalus—sometimes resulted in injury to the brain, lumbar puncture is now performed not only to relieve excessive pressure in the cerebrospinal canal, but also to facilitate diagnosis in meningeal malconditions, to withdraw from the canal deleterious inflammatory products, to irrigate and antisepticize locally, and to inject drugs for purposes of anesthetization or antitoxinization.

In this country the appearance during the past few years of cerebrospinal meningitis in widespread epidemic form has given increased incentive to and added opportunity for the study of this subject. As a result of experience with a considerable number of cases in the service of Dr. Koplik and myself at Mount Sinai Hospital, in which lumbar puncture has been performed, we have concluded that the best technic is that which follows with but little variation the original directions laid down by Quincke in his classical articles on the subject. Since there are right and wrong ways of performing even so simple an operation as lumbar puncture, I may be pardoned for giving an elementary and detailed description of its technic.

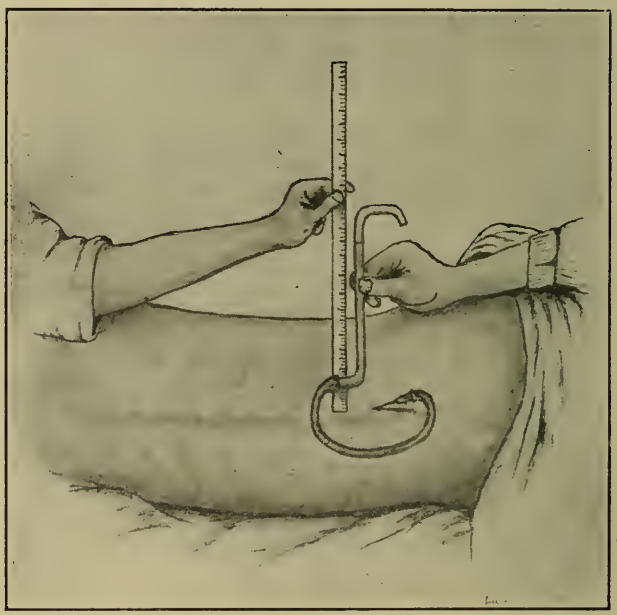
*Read before the Harlem Medical Association, June 5, 1906.

Anatomical Considerations and Landmarks.—Between the arachnoid membrane and pia mater of the brain and the spinal cord is the subarachnoid space, which at the lower part of the spinal canal is a spacious *cul-de-sac* surrounding the nerves forming the cauda equina. This space communicates with the general ventricular cavity of the brain by means of the foramen of Magendie at the inferior boundary of the fourth ventricle, and contains the serous secretion whose character and quantity undergo certain changes in pathological conditions. Up to the first year of life the spinal cord extends at least as far as the lower level of the third lumbar vertebra; but, owing to the relatively rapid growth in infancy of the vertebræ, it gradually recedes from below and in adults does not reach below the first lumbar vertebra. In children, therefore, to avoid injury to the cord the puncture should be made in one of the lower lumbar spaces.

For orientation the landmarks are the highest positions of the iliac crests, a line connecting which usually crosses the fourth lumbar interspace. The anatomical factors contributing to the ease with which puncture is performed in the lumbar region are the following: (1) The spinous processes of the lumbar vertebræ are short and thick; (2) the spines in this part of the vertebral column are far apart; (3) the long axis of the lumbar spines has but a slight angular elevation, rendering the general direction of the interspinous spaces almost horizontal. On the other hand, the supraspinous and intraspinous ligaments in the lumbar region are broad, thick, and tough, and in adults are not readily penetrated by the puncture needle.

Preparation and Position of the Patient and Operator.—As a rule the horizontal position of the patient is to be preferred. However, in the event of a seeming dry tap, provided there has been no error in technic, it may be desirable to increase the hydrostatic pressure of the cerebrospinal fluid by sitting the patient up. It has been claimed that in the sitting posture there occurs in pathological conditions sedimentation of the cerebrospinal fluid, facilitating successful microscopical examination; this advantage seems to us largely a theoretical one, and is offset by the disadvantages of insufficient spinal flexion and the danger in cases of greatly increased tension of untoward symptoms resulting from too rapid withdrawal of fluid.

The child is placed on its left side close to the edge of the bed or operating-table. It is the duty of one assistant, facing the flexor surface of the patient's body, to effect forced flexion of the spine by approximating the patient's neck and knees; to accomplish this the assistant grasps with his right hand the nape of the child's neck and with his left hand the child's legs. There are three advantages in this position: It prevents struggling of the patient; brings into



prominence the lumbar spines; and increases the elastic pressure of the spinal fluid. It is the duty of a second assistant, while the operator is sterilizing his hands, to asepticize in the usual surgical way the skin at the site and vicinity of puncture. At the edge of the table and on the floor are spread wet bichloride towels, and sterile towels about the field of operation. As a rule no anesthetic is required. In a case of tetanus, however, treated about one year ago by subarachnoid injections of tetanus antitoxine, I employed chloroform anesthesia because of the patient's extreme hyperesthesia and violent convulsions.

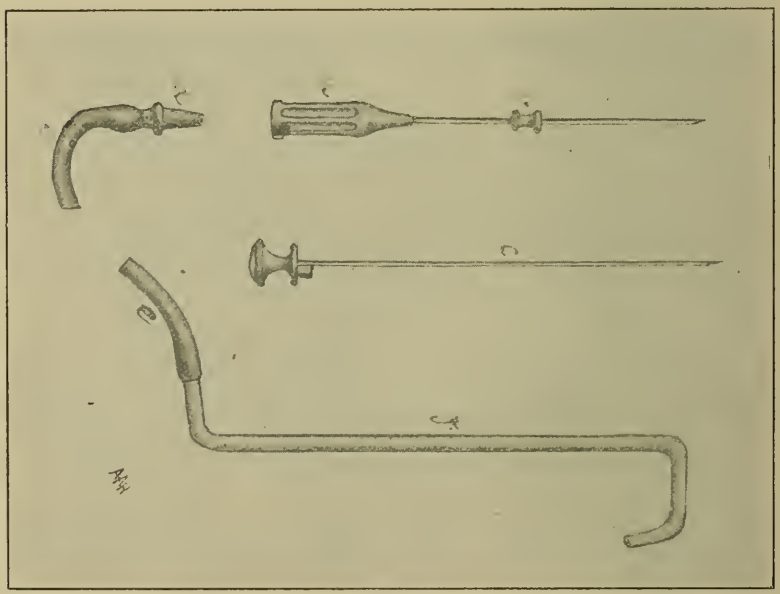
Instruments: The Quincke Needle and Manometer. (See Fig. 1)—Needles constructed according to the directions of Quincke have for several years been accessible to New York physicians, and the older methods of employing a syringe needle or canula and trocar with or without a handle are fast passing into disuse. The latest model of a lumbar puncture set, which I recently imported from Kiel, where Beckmann makes them, according to Quincke's directions, consists of: (1) Three needles of different lengths and diameters with corresponding stilettes; (2) a glass manometer tube; (3) rubber tubing and coni for connecting the needles with the manometer; (4) a glass graduate for collecting and measuring the cerebrospinal fluid; (5) a glass funnel to be connected with the needle by rubber tubing for irrigating the canal; (6) a lancet for slitting the dura. In practice I have occasion to employ only (1), (2), (3), and (4), always connecting the needle and manometer (so as to secure uniform pressure measurements) with a piece of catheter tubing, No. 5 F., forty centimetres long. If the puncture is for diagnostic purposes, sterile test tubes should be used for collecting and measuring the fluid. In measuring the pressure a piece of steel tape graduated in centimetres and inches is useful.

The needles are from four to ten centimetres long and from 0.8 to 1.6 millimetres in diameter. The distal extremity of the needle is bevelled at an acute angle to a sharp point, forming a conic section with the end of the stilette when the latter is in situ flush with the end of the needle. The manometer tube is fourteen centimetres long and 2.5 millimetres in diameter.

Recently I have had constructed a flange like, movable guard for the needle (see *b*, Fig. 1) to be set before puncture at a distance from the point of the needle corresponding to the probable depth of insertion. The object of this appliance is to prevent too deep an insertion of the needle which sometimes results in hemorrhage caused by puncture of the venous plexus in the anterior wall; the guard also serves to steady the needle after it has been inserted.

Method of Procedure.—The operator sits next to the bed and, after sterilization by boiling of the needle, manometer, tubing with the conus attached, and measuring tape, with sterile hands he locates the desired space in which with his finger nail he makes an indenta-

tion half-way between the two spines—in the median line in children, five to ten millimetres to the right in adults. Firmly grasping the needle and enclosed stilette in the right hand, fixing the guard at a distance from the point of the needle about equal to the distance it is assumed the needle will enter, and with the left hand making firm counterpressure over the next higher spine, the needle is inserted with its point on the nail-mark in a direction almost horizontal, upward to an angle of about 10°. Where in adults the lateral insertion is used, the direction is inward and upward. The stilette is now



withdrawn and the conus is inserted into the hilt of the needle, thus connecting the latter with the manometer by means of the tubing. The horizontal arm of the manometer tube is held about three centimetres below the level of the needle till the cerebrospinal fluid appears in the manometer, after which the horizontal arm of the instrument is raised to the level of the needle and the height of the column of fluid in the manometer is read off on the tape, its zero-mark being at the level of the site of puncture (see Fig. 2). The tube is again

lowered, and the desired amount of fluid allowed to escape into sterile tubes. From time to time the pressure should be measured by raising the tube to see whether the normal (from three to five centimetres) has been reached. Quincke warns us of the danger of allowing the pressure to reach a degree much below normal, especially when in certain pathological conditions it is exceedingly high at the outset, and the decrease is very rapid; in first punctures and in cases of doubtful diagnosis special precautions should be taken in this regard. Pfaundler states that when the pressure has reached from two to two and a half centimetres, it is not as a rule safe to withdraw any more cerebrospinal fluid.

If the flow is very slow because of low pressure, it may be artificially increased as follows by influencing one or more of its three components: (1) The *hydrostatic* pressure, which is represented by the weight of the column of cerebrospinal fluid, can be increased by sitting the patient up. (2) The *elastic* pressure, or that exerted by the walls of the subarachnoid space and ventricles, can be increased by effecting more forcible spinal flexion. (3) The *vascular* pressure, or that carried over the heart through the blood-vessels, can be increased by making the patient cough, cry, or breathe deeply, or by compressing the patient's abdomen. It is mainly the vascular element that gives rise to the clinical manifestations of excessive pressure.

In performing lumbar puncture the manometer should be used as a routine, for the reason that the pressure constitutes the best guide in deciding how much fluid is to be withdrawn. To some extent, however, the quantity to be taken off will depend upon the purpose of the puncture, the character of the fluid, and the condition of the patient.

The total quantity of cerebrospinal fluid in the normal adult is said to be from fifteen to sixty c.c.; in adults in whom the quantity of cerebrospinal fluid is presumably normal it is uncommon to obtain more than fifteen c.c. on lumbar puncture. In serous and tuberculous meningitis, hydrocephalus, tumors of the brain, and uremia, the fluid is clear; in pachymeningitis or brain trauma, it may be bloody; in meningitis due to the meningococcus, pneumococcus, or streptococcus, it is cloudy or purulent; in all of these conditions it is increased in quantity and pressure. My own experience with high pressure and

increase in the quantity of cerebrospinal fluid is limited to cases of serous, cerebrospinal, tuberculous and streptococcus meningitis, and hydrocephalus. In forty lumbar punctures in which the patients varied in age from three months to twelve years the highest pressure directly after insertion of the needle was fifty-four centimetres, the lowest four centimetres, and the average 26.2 centimetres. In these same cases the average of the various quantities which were of necessity withdrawn to render the pressure normal was thirty-two c.c.; the maximum sixty c.c., and the minimum five c.c. In cases of hydrocephalus enormous quantities can be taken off without any ill effects; in one case I withdrew more than one hundred and fifty c.c on three separate occasions. In a small proportion of cases, even with most painstaking technic, bright bloody fluid is obtained, probably owing to puncture of the venous plexus in the anterior wall of the canal; this accident is never harmful to the patient. Dark decomposed blood indicates a trauma or pachymeningitis.

If fluid does not appear immediately upon withdrawal of the stilette one should not conclude that there is a "dry tap" before waiting a reasonable period and trying the artificial means of increasing pressure, as described before. If these attempts are unsuccessful the puncture should be repeated in another space; but it is seldom justifiable to go further than this. The causes of dry taps are faulty technic, propulsion of the dura before the point of the needle, occlusion of the needle with tissue, fibrin, or pus, abnormally small amount of secretion, or closure of the foramen of Magendie or aqueduct of Sylvius, owing to the pressure of a tumor or to inflammatory conditions.

The usual depth to which the needle has to be inserted in order to obtain fluid is two to four centimetres in children and four to seven centimetres in adults. The depth of the insertion is easily measured by means of the guard already described. Of course this distance varies with the age and build of the patient; in the series of cases mentioned the depth of insertion was least (two centimetres) in the youngest patient (three months), and greatest (4.6 centimetres) in the oldest patient (twelve years). Some of the measurements which I now take as a routine in every case of lumbar puncture

are arranged in a table of ten cases taken from our series. (See Table I.)

In the description of the technic special stress has been laid on the value and importance of the routine use of the manometer tube. It is probable that many of the reported fatalities occurred as a result of too free or too rapid evacuation of the fluid; this can be avoided if the pressure is carefully observed and never allowed to fall much below normal. Most important is this precaution in cases of doubtful diagnosis, especially if the presence of a brain tumor is suspected. It is suggested that in performing lumbar puncture certain observations be regularly made, as shown in Table II. In view of the increasing value and extending applicability of the operation of lumbar puncture, I wish in conclusion to emphasize the importance and urge the adoption of a systematic and uniform method of procedure which experience has shown to be simple, safe, and satisfactory.

TABLE I

No. of Case	Age of Patient	Diagnosis	Pressure		Depth to Which Needle was Inserted	Quantity of Fluid Withdrawn	Number of Puncture	Interval Since Last Puncture	Day of Illness
			Immediately After Insertion	Just Before Withdrawal of Needle					
38	3 months	Streptococcus meningitis	39 cm.	4 cm.	2 cm.	40 c. c.	1st	—	—
19	8 months	Cerebrospinal meningitis	18 "	2 "	2.1 "	5 "	2d	3 days	Sixth
8	10 months	Tuberculous meningitis	14 "	3 "	1.75 "	25 "	1st	—	Nineteenth
32	18 months	Cerebrospinal meningitis	18 "	3 "	2.8 "	30 "	3d	1 day	Not known
25	17 months	Cerebrospinal meningitis	4 "	0 "	3.2 "	5 "	1st	—	"
26	2 years	Cerebrospinal meningitis	25 "	3 "	3 "	30 "	1st	—	"
6	7 years	Cerebrospinal meningitis	51 "	0 "	3.5 "	60 "	4th	4 days	Twelfth
24	3 years	Tuberculous meningitis	26 "	4 "	2.8 "	20 "	1st	—	Not known
16	5 years	Cerebrospinal meningitis	22 "	3 "	3.5 "	40 "	2d	8 days	Thirty-second
1	7½ years	Cerebrospinal meningitis	13 "	2.2 "	4 "	25 "	5th	9 days	Thirty-eighth
Average in these ten cases....			23 cm.	2.4 cm	2.9 cm.	28 c. c.			

Average age 2½ years.

TABLE II.

Name of patient, B. K. Sex, female. Age, six months.
Diagnosis, cerebrospinal meningitis.
Number of puncture, third. Day of illness, forty-ninth.
Interval in days since last puncture, ten.
Position of the patient, left lateral. Sat up? No.
Pressure of fluid at outset, 18 cm.
Pressure of fluid before withdrawal of needle, 3.4 cm.
Quantity of fluid withdrawn, 26 c.c.
Time of flow, 3½ minutes.
Interspace, fourth lumbar. Direction of needle, slightly upward.
Depth of insertion of needle, 2.2 cm.
Interspace, fourth lumbar. Direction of needle, slightly upward.
Depth of insertion of needle, 2.2 cm.
Character of fluid, turbid.
Pathological report:
Albumin, 0.1 per cent.
Reduction of Fehlings sol., negative.
Spreads, meningococcus.
Cultures, not made.
Inoculations, not made.
Cytology, polymorphonuclears, 92 per cent.; lymphocytes, 8 per cent.

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STATISTICS OF NEUROLOGICAL SERVICE DURING 1906.

B. Sachs, M.D.,
ATTENDING NEUROLOGIST.
William Hirsch, M. D.,
ADJUNCT NEUROLOGIST.

Nervous Diseases.	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Neurasthenia	1	..	5	19	3	4	..	..	9	23
Neurasthenia with Bell's palsy	..	..	..	1	..	..	..	..	..	1
Neurasthenia—syphilis	..	..	1	..	..	..	..	..	1	..
Neurasthenia —Gastric neurosis	..	..	1	1	1	..	..	..	2	1
Hysteria	..	1	1	4	..	2	..	..	1	7
Hysterical paralysis	1	..	..	..	..	..	..	..	1	..
Spinal irritation	..	..	..	1	..	..	..	..	..	1
Sciatic neuritis	3	2	2	2	..	1	..	..	5	5
Neuritis, peripheral	..	..	2	1	2	..	..	..	4	1
Anterior crural neuritis	..	..	..	..	..	1	..	..	..	1
Hemiplegia	1	1	4	4	1	..	1	2	7	7
Hemiplegia with diabetes	..	..	..	..	..	..	..	1	..	1
Tabes dorsalis	..	..	2	2	1	..	..	..	3	2
Dementia	..	..	..	..	1	..	..	..	1	..
Acute confusional insanity	..	..	..	..	..	1	..	..	..	1
Torticollis, rheumatic	..	..	..	1	..	..	..	..	..	1
Lumbago	..	..	2	..	1	..	..	..	3	..
Amyotrophic lateral sclerosis	..	..	1	..	..	1	..	..	1	1
Acute ascending paralysis	..	..	..	..	..	..	1	..	1	..
Acute alcoholism (broncho-pneumonia)	..	..	..	..	..	..	..	1	..	1
Cephalalgia	1	..	..	..	..	..	..	..	1	..
Cerebral thrombosis	..	1	..	..	..	1	..	..	..	2
Chorea minor	..	..	1	1	1	..	..	1	2	2
Combined sclerosis	..	..	1	2	..	..	..	..	1	2
Spinal hemorrhage (traumatic)	..	..	2	..	..	..	1	..	3	..
Meningo-myelitis	..	..	..	..	..	..	1	..	1	..
Cerebro-spinal lues	..	..	2	..	1	..	..	..	3	..
Cerebellar abscess	..	..	..	..	..	..	1	..	1	..
Post-febrile dementia	..	..	..	..	..	2	..	..	..	2
Chronic meningeal tuberculosis	..	..	..	..	1	..	..	..	1	..
Polio-encephalitis	..	..	1	..	..	..	..	..	1	..
Cerebral arterio-sclerosis	..	..	1	..	..	..	..	..	1	
General paresis	..	..	..	..	1	..	..	1	1	1
Cerebral tumor	..	..	..	1	..	..	..	..	..	1
Cerebellar tumor	..	..	..	..	1	..	1	..	2	..
Neuralgia, trigeminal	..	..	1	..	..	..	..	..	1	..
Hypochondriacal psychosis	..	1	..	..	..	..	..	..	..	1
Cerebral syphilis (pregnancy)	..	..	..	1	..	..	..	..	..	1
Paraplegia, syphilitic	..	..	..	1	..	..	..	..	..	1
Post-syphilitic encephalitis	..	..	..	..	..	..	1	..	1	..
Chronic anterior poliomyelitis	..	..	1	..	..	..	..	..	1	..
Total	7	6	31	42	15	13	7	6	60	67

STATISTICS OF DERMATOLOGICAL SERVICE DURING 1906.

S. LUSTGARTEN, M.D.,
ATTENDING DERMATOLOGIST.

F. J. LEVISEUR, M.D.,
ADJUNCT DERMATOLOGIST.

Cutaneous Diseases.	Cured.		Improved.		Unimproved.		Died.		Total.	
	M	F	M	F	M	F	M	F	M	F
Eczema, acute	6	1	3	2	..	..	..	..	9	3
" subacute	..	..	1	..	..	..	..	..	1	..
" chronic	..	..	3	..	..	..	..	..	3	..
Erysipelas	1	1	1	..	..	1	..	..	2	2
Dermatitis, acute	1	..	..	..	..	..	..	..	1	..
Scabies	3	..	..	..	..	..	..	..	3	..
Dermatitis with pseudo-leukemia	..	..	1	..	..	..	..	..	1	..
Sycosis	2	..	..	..	..	..	..	..	2	..
Lupus erythematosus	..	..	..	2	..	..	..	..	..	2
Lupus vulgaris	..	..	1	..	..	..	..	..	1	..
Erythema nodosum	..	1	..	..	..	..	..	..	..	1
Ulcer, leg (tertiary)	1	1	..	..	..	..	..	..	1	1
" leg	..	..	1	..	..	..	..	..	1	..
" lip	1	..	..	..	..	..	..	..	1	..
" heel (chronic)	..	..	1	..	..	..	..	..	1	..
Psoriasis	1	..	3	..	..	..	..	..	4	..
Gumma, soft palate (tertiary)	..	1	..	..	..	..	..	..	..	1
Congenital lues	..	..	1	..	..	..	..	..	1	..
Impetigo contagiosa	2	1	..	..	..	..	..	..	2	1
Gummata, multiple (tertiary)	..	1	..	..	..	..	..	..	..	1
Sarcomata skin (multiple)	..	..	1	..	..	..	..	..	1	..
Bromide ulcer leg	..	..	..	1	..	..	..	..	..	1
Gumma of nose	..	..	1	..	..	..	..	..	1	..
Furunculosis	2	..	..	..	..	..	..	..	2	..
Phlegmon of arm	1	..	..	..	..	..	..	..	1	..
Erythema (autointoxication)	1	..	..	..	..	..	..	..	1	..
Ulcer, varicose	..	1	..	..	..	..	..	..	..	1
Phagedenic ulcer (lip)	1	..	..	..	..	..	..	..	1	..
Pityriasis rubra	..	..	1	..	..	..	..	..	1	..
Total	23	8	19	5	0	1	0	0	42	14

STATISTICAL REPORT OF THE FIRST SURGICAL DIVISION. 1905.

A. G. Gerster, M.D.,
ATTENDING SURGEON.

A. A. Berg, M.D., and A. V. Moschcowitz, M.D.,
ADJUNCT ATTENDING SURGEONS.

Diseases of Head and Neck.	Total.	Cured.	Improved.	Unimproved.	Died
Scalp:					
Hematoma of scalp	2	1	..	..	*1
" " " with compression of brain	1	...	..	1	..
Angeioma of scalp	1	1	..	..	..
Phlegmon of scalp	1	1	..	..	..
Skull:					
Fracture of vault	2	...	..	1	1
" " " (old depressed with pachymeningitis)	1	1	..	..	..
" " base with laceration of brain	2	...	..	..	2
Necrosis of frontal bone	1	1	..	..	..
Frontal sinusitis	1	...	*1	..	..
Brain:					
Cerebellar tumor	1	...	..	*1	..
Chronic hydrocephalus	1	...	..	*1	..
Nerves:					
Trigeminal neuralgia	3	...	*1	1	1
Neuro-fibroma of cervical cutaneous nerve	1	1	..	..	..
Parotid:					
Chondro-endothelioma of parotid	1	1	..	..	..
Tuberculosis of parotid	1	1	..	..	..
Face:					
Epithelioma of cheek	2	....	..	*2	..
" " chin	1	...	..	*1	..
Cavernoma lipomatosam of face with giant growth of same side	1	...	1	..	..
Organized ecchymosis of skin under eyelid	1	1	..	..	..
Upper Jaw:					
Osteomyelitis of superior maxilla	1	1	..	..	..
Lower Jaw:					
Osteomyelitis of inferior maxilla	7	4	3	..	..
Osteo-periostitis of inferior maxilla	1	...	1	..	..
Suppurative periostitis of inferior maxilla	1	...	1	..	..

* Not operated.

Diseases of Head and Neck—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Osteomyelitis of inferior maxilla with cavernous sinus thrombosis	2	...	..	..	2
Ankylosis of left inf. maxillary articulation	1	...	..	*1	..
Endotheliomatous odontoid cyst of inf. maxilla	1	1	..	..	..
Adimantinoma of inferior maxilla	1	1	..	..	..
Mouth, Pharynx and Larynx:					
Cleft palate	1	...	1	..	..
" " and double hair-lip	1	...	1	..	..
Carcinoma and syphilis of tongue	1	...	..	*1	..
Ranula	1	1	..	..	..
Peritonsillar abscess	1	1	..	..	..
Adenoids	1	...	..	*1	..
Epithelioma of mouth	1	...	..	1	..
" " " and superior maxilla	1	1	..	..	..
" " anterior pillar of fauces	1	...	..	*1	..
Carcinoma of larynx	2	1	1	..	..
Primary septic laryngitis (edema of glottis)	1	1	..	..	..
Laryngeal stenosis of unknown origin	1	...	..	*1	..
Nose:					
Deviation of nasal septum with chronic ethmoiditis	1	1	..	..	..
" " " " with enchondrosis of septum	1	1	..	..	..
Fracture of nasal bone with deviation of septum	1	1	..	..	..
Post-operative nasal hemorrhage	1	*1	..	..	..
Neck:					
Abscess of neck	8	8	..	..	..
Glandular abscess of neck, tonsillitis	1	*1	..	..	..
Angina Ludovici	2	2	..	..	..
Thyro-glossal fistula	1	1	..	..	..
Tracheal canula decubitus	1	*1	..	..	..
Cervical rib	1	1	..	..	..
" " and brachial neuritis	1	1	..	..	..
Lympho-sarcoma of neck	2	1	..	*1	..
Lipoma of neck	1	1	..	..	..
Tuberculous adenitis	7	3	3	†1	..
" abscess of neck	3	3	..	..	..
Thyroid Gland:					
Cyst	4	4	..	..	..
Malignant adenoma	1	1	..	..	..
Chronically inflamed goitre	1	1	..	..	..
	91	54	14	16	7
Operations on Head and Neck.					
Aspiration and evacuation of hematoma of scalp	1	1	..	..	..
Incision, evacuation and suture for hematoma of scalp	1	...	..	‡1	..
Ignipuncture for angeioma of scalp	1	1	..	..	..

* Not operated.
†Gland removed for diagnosis, operation then refused.
‡Patient had symptoms of compression.

Operations on Head and Neck—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Ignipuncture for angeioma of ear	1	...	1	..	..
Hemithyroidectomy for chronically inflamed goitre	1	1	..	..	..
Extirpation of neuro-fibroma of cervical cutaneous nerve	1	1	..	..	..
" of chondro-endothelioma of parotid	1	1	..	..	..
" of parotid gland for tuberculosis	1	1	..	..	..
" of endotheliomatous odontoid cyst	1	1	..	..	..
" of ranula	1	1	..	..	..
" of enchondrosis of nasal septum	1	1	..	..	..
" of thyro-glossal fistula	1	1	..	..	..
" of glands of neck for lympho-sarcoma	1	1	..	..	..
" " " " " for tuberculosis	6	3	3	..	..
" of lipoma of neck	1	1	..	..	..
" thyroid cyst	4	4	..	..	..
" malignant adenoma of thyroid	1	1	..	..	..
Resection of superior maxilla for carcinoma of mouth	1	1	..	..	..
" " " " for carcinoma of cheek	1	1	..	..	..
" " " " and nerve for neuralgia	1	...	..	1	..
" " triangular cart. of nose and extirpation of middle and inferior turbinates	1	1	..	..	..
Craniotomy and drainage for brain abscess	1	...	..	..	*1
" " aspiration of brain for suspected abscess	1	...	..	1	..
" for fracture of base and extradural hemorrhage	1	...	..	..	1
" " old depressed fracture of skull	1	1	..	..	..
Intracranial neurectomy for trigeminal neuralgia	1	...	..	..	1
Aspiration of brain for suspected abscess	1	...	..	..	1
Incision of scalp for suspected fracture of vault	1	...	..	..	1
Refracture of nasal bones for malposition	1	1	..	..	..
Cheiloplasty for double hare-lip	1	1	..	..	..
Secondary staphylorrhaphy	1	...	1	..	..
Excision of cervical rib	2	2	..	..	..
" " organized ecchymosis under eye	1	1	..	..	..
" (partial) of angiolipoma of face	1	...	1	..	..
Complete laryngectomy for carcinoma of larynx	1	1	..	..	..
Tracheotomy for carcinoma of larynx	1	...	1	..	..
" " adductor paralysis of larynx from metastases from carcinoma of cardia	1	...	†1	..	..
Scarification of epiglottis for edema	1	1	..	..	..
Osteotomy and drainage for osteomyelitis of inferior maxilla	4	1	2	..	1
" for adimantinoma of inferior maxilla	1	1	..	..	..
Sequestrectomy for necrosis of frontal bone	1	1	..	..	..
Curettage for osteomyelitis of superior maxilla	1	1	..	..	..
Ligation of both external carotids preliminary to excision of tumor of face	1	1	..	..	..
Incision and drainage of phlegmon of scalp	1	1	..	..	..
" " " " submaxillary abscess	7	5	1	..	‡1

*Death recorded under disease of thorax.
†Case recorded under disease of stomach.
‡Same case as recorded as died under osteomyelitis of inferior maxilla.

Operations on Head and Neck—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Incision and drainage for suppurative periostitis of inferior maxilla	1	...	1		
" " " for phlegmon of neck and face	1	...	..	..	1
" " " " abscess of neck	7	7	..	..	..
" " " " abscess of neck (tuberculous)	3	3	..	..	..
" " " " angina Ludovici	2	2	..	..	..
" " " " infected metastases of neck from carcinoma of esophagus	1	...	..	..	†1
Incision of peritonsillar abscess	...	...	..	..	..
	78	53	12	4	9
Diseases of Thorax.					
Abscess of breast	4	4	..	..	..
" " " (bilateral)	2	2	..	..	..
Tuberculosis of breast	2	2	..	..	..
Fibroma of breast	2	2	..	..	..
Fibro-sarcoma of breast	1	1	..	..	..
Carcinoma of breast	14	13	1	..	..
Recurrent carcinoma of breast	1	1	..	..	..
Empyema of pleura	1	1	..	..	..
" " " and perforation of bronchus	1	...	..	..	1
" " " and endocarditis	1	...	..	..	1
" " " and pyemia	2	1	1	..	..
Thoracic sinus following empyema	4	2	2	..	..
" " following empyema and embolism, brain abscess and meningitis	1	...	..	..	1
Pleurisy	1	*1	..	..	..
New growth of pleura	1	...	..	*1	..
Lipoma of dorsal region	1	1	..	..	..
Pectoral abscess and pneumonia	1	...	..	..	1
Abscess of scapular region	1	1	..	..	..
Fractured rib	1	*1	..	..	..
Gunshot wound of thorax	3	*1	*1	*1	..
Carcinoma of esophagus	3	...	1	*1	*1
" " " with infected metastasis of neck	1	...	..	..	1
Esophageal stenosis	1	...	..	*1	..
Traumatic esophagitis	1	*1	..	..	..
	51	35	6	4	6
Operations on Thorax.					
Incision and drainage of abscess of breast	8	8	..	..	..
Amputation of breast for tuberculosis	1	1	..	..	..
Halsted operation for tuberculosis of breast and axillary glands	1	1	..	..	..

* Not operated.
†Death recorded under diseases of thorax.

Operations on Thorax—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Excision of fibroma of breast	1	1	..	..	..
Amputation of breast for fibroma	1	1	..	..	..
Radical operation for fibro-sarcoma of breast	1	1	..	..	..
" " " carcinoma of breast	14	13	1	..	..
Secondary operation for recurrent carcinoma of breast	1	1	..	..	..
Resection of ribs for empyema	8	3	2	..	3
" " " " subphrenic abscess	2	1	..	1	..
" " " " abscess of lung	1	...	..	..	†1
Intercostal incision for empyema	1	1	..	..	..
Dilatation of empyema sinus	1	...	1	..	..
Extirpation of lipoma	2	2	..	..	..
Incision and drainage of pectoral abscess	1	...	..	..	1
" " " " abscess of scapular region	1	1	..	..	..
	45	35	4	1	5
Diseases of the Stomach.					
Gastric ulcer	2	2	..	..	..
" " perforated with diffuse purulent peritonitis	1	1	..	..	..
" " and lues	1	*1	..	..	..
Carcinoma of fundus of stomach	1	...	..	*1	..
" " cardia of stomach with metastases and adductor paralysis of larynx	1	...	1	..	..
Hypertrophic pyloritis	1	...	..	1	..
Stenosis of pylorus and duodenum by bands	1	...	1	..	..
" " " (syphilitic)	1	...	..	..	1
Perigastric adhesions following Finney operation	1	...	*1	..	..
	10	4	3	2	1
Operations on Stomach.					
Laparotomy and drainage for perforation gastric ulcer with diffuse purulent peritonitis	1	1	..	..	..
Finney operation for ulcer of stomach	1	1	..	..	..
Posterior gastro-enterostomy ulcer of stomach	4	2	1	..	‡1
Exploratory laparotomy for hypertrophic pyloritis	1	...	..	1	..
Gastrectomy (partial) for syphilitic pyloric stenosis	1	...	..	..	1
Pylorectomy and partial duodenectomy	1	§1	..	..	..
Gastrostomy (Kader)	1	...	‖1	..	..
Anterior gastro-enterostomy	1	...	..	..	β1
	11	5	2	1	3

* Not operated.
† Case and death recorded under "appendix."
‡Same case as recorded under gastrectomy.
§For myxoma of duodenum (recorded under intestines).
‖For carcinoma of esophagus.
βDeath recorded under diseases of pancreas.

	Total.	Cured.	Improved.	Unimproved.	Died.
Diseases of Intestines.					
Large intestine:					
Intussusception	2	1	..	..	1
Volvulus of sigmoid	1	...	..	..	1
" " " and peritonitis	1	...	..	..	1
Intestinal obstruction by band	1	...	..	..	1
Carcinoma of ascending colon	1	...	1	..	..
" " transverse colon	1	...	1	..	..
Stricture of ileo cecal valve (polypoid colitis)	1	...	..	..	1
Small intestine:					
Intussusception	1	...	..	..	1
Volvulus	1	1	..	..	..
Myxoma of duodenum	1	1	..	..	..
Stenosis of jejunum by adhesions after post. gastro-enterostomy	1	1	..	..	..
Obstruction by band	1	...	..	..	1
Perforated typhoid ulcer	2	...	..	..	2
Suspected intestinal obstruction by adhesions	1	1	..	..	..
Sarcoma of intestines	1	...	..	1	..
	17	5	2	1	9
Operations on Intestines.					
Large intestine:					
Laparotomy and reduction of intussusception	1	1	..	..	..
" " resection of intestine for intussusception	1	...	..	..	1
" reduction and sigmoidopexy for volvulus of sigmoid (secondary laparotomy for obstruction)	1	...	..	..	1
" and resection of sigmoid for volvulus	1	...	..	..	1
" " division of band for obstruction	1	...	..	..	1
Ileo-colostomy for carcinoma of ascending colon	1	...	1	..	..
" " " " transverse colon	1	...	..	..	1
Colostomy—Carcinoma of rectum	3	...	2	1	..
Laparotomy for obstruction by gauze after appendicectomy	1	1	..	..	..
" and division of adhesions after appendicectomy	1	1	..	..	..
Small intestine:					
Laparotomy and reduction of intussusception	1	...	..	..	1
Enterotomy and reduction for volvulus	1	1	..	..	..
Pylorectomy and resection of upper part of duodenum for myxoma	1	1	..	..	..
Entro-enterostomy for stenosis of jejunum by adhesions after gastro-enterostomy	1	1	..	..	..
Resection of ileum for gangrene due to obstruction by bands after appendicectomy	1	...	..	..	*1
Laparotomy and division of bands for obstruction	1	...	..	..	1
Enterorrhaphy for perforated typhoid ulcers	2	...	..	..	2
Laparotomy for suspected intestinal obstruction	1	1	..	..	..
" " inoperable sarcoma of intestines	1	...	..	..	1
	23	7	4	2	10

*Death recorded under appendix.

Diseases of Appendix Vermiformis.	Total.	Cured.	Improved.	Unimproved.	Died.
Acute catarrhal appendicitis	23	†23	..	..	..
" appendicitis with abscess	9	9	..	..	..
Appendicitis abscess	2	1	1	..	..
Acute appendicitis with multiple abscesses and thrombosis of omentum	1	...	..	..	1
Acute appendicitis with general fibrino-purulent peritonitis and intestinal obstruction	1	...	..	..	1
Acute appendicitis with gonorrheal salpingitis	1	1	..	..	..
" appendicitis and typhoid	1	1	..	..	..
" appendicitis with pylo-phlebitis; abscess of lung, brain embolus and abscess	1	...	..	..	*1
" gangrenous and perforative appendicitis	11	11	..	..	..
" gangrenous and perforative appendicitis and pyle-phlebitis	1	1	..	..	..
" gangrenous and perforative appendicitis with abscess.	38	36	..	..	2
" gangrenous and perforative appendicitis with abscess and secondary intestinal obstruction from foreign body	1	1	..	..	..
" gangrenous and perforative appendicitis with multiple abscesses	1	...	..	..	1
" gangrenous and perforative appendicitis and abscess with strangulated testicle	1	1	..	..	..
Perforated diverticulum of appendix with abscess	1	1	..	..	..
Acute gangrenous and perforative appendicitis with diffuse serous peritonitis and secondary intestinal obstruction by bands	1	...	..	..	1
Acute gang. and perf. appendicitis with diffuse sero-purulent peritonitis	12	12	..	..	..
" gang. and perf. appendicitis with diffuse purulent peritonitis	6	4	..	..	2
" gang. and perf. appendicitis with diffuse purulent peritonitis and subphrenic abscess	1	1	..	..	..
Empyema of appendix	8	8	..	..	..
" " " and myoma of uterus	1	1	..	..	..
Subacute catarrhal appendicitis	3	1	†2	..	..
Chronic appendicitis	34	33	..	*1	..
" " and abscess	1	1	..	..	..
" " and secondary intestinal obstruction by adhesions	1	1	..	..	..
" " and nephralgia	1	1	..	..	..
	162	149	3	1	9
Operations on Appendix.					
Appendicectomy for acute catarrhal appendicitis	14	14	..	..	..
" and drainage for acute catarrhal appendicitis	7	7	..	..	..

* No appendicectomy.
† Two cases not operated.

Operations on Appendix—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Appendicectomy and drainage for acute appendicitis with abscess	9	9	..	..	..
Incision and drainage for appendicitis abscess	2	1	1	..	..
Appendicectomy and drainage for acute appendicitis with multiple abscesses and thrombosis of omentum	1	...	..	..	1
" and drainage for acute appendicitis with diffuse fibrino-purulent peritonitis and intestinal obstruction	1	...	..	..	1
Acute appendicitis with gonorrheal salpingitis	1	1	..	..	..
" " and typhoid	1	1	..	..	..
Appendicectomy for acute gangrenous appendicitis	4	4	..	..	..
" and drainage for acute gangrenous or perforative appendicitis	7	7	..	..	..
" and drainage for acute gangrenous or perforative appendicitis with pyle-phlebitis	1	1	..	..	..
" and drainage for acute gangrenous or perforative appendicitis with abscess	39	37	..	..	2
" and drainage for acute gangrenous appendicitis with multiple abscesses	1	...	..	..	1
" and drainage for acute gangrenous appendicitis with abscess and strangulated testicle	1	1	..	..	..
" and drainage for perforated diverticulum of appendix	1	1	..	..	..
" and drainage for acute gangrenous or perforative appendicitis with diffuse serous peritonitis	1	...	..	..	1
" and drainage for acute gangrenous or perforative app. with diffuse sero-purulent peritonitis	12	12	..	..	..
" and drainage for acute gangrenous perforative appendicitis with diffuse purulent peritonitis	7	5	..	..	2
" for empyema of appendix	5	5	..	..	..
" and drainage for empyema of appendix	4	4	..	..	..
" for subacute catarrhal appendicitis	1	1	..	..	..
" for chronic catarrhal appendicitis	32	32	..	..	..
" and drainage for chronic catarrhal appendicitis	3	3	..	..	..
" and drainage for chronic appendicitis abscess	1	1	..	..	..
" done in conjunction with other diseases(appendix normal)	4	4	..	..	..
" for suspected appendicitis (appendix normal).	1	...	..	1	..
	161	151	1	1	8
Diseases of the Liver.					
Abscess of liver	3	1	..	..	2

Diseases of the Liver—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Abscess of liver (died under anesthesia)	1	...	..	..	*1
Cholangitis	2	2	..	..	..
Echinococcus cyst of liver	1	1	..	..	..
	7	4	..	..	3
Operations for Diseases of Liver.					
Transpleural hepatotomy and drainage for liver abscess	2	...	..	..	2
Laparotomy, hepatotomy and drainage for liver abscess	1	1	..	..	..
Cholecystostomy for cholangitis	2	2	..	..	..
Transpleural excision and drainage for echinococcus cyst of liver	1	1	..	..	..
	6	4	..	..	2
Diseases of Pancreas.					
Carcinoma of head of pancreas	1	...	..	..	1
Pancreatic cyst	1	...	*1	..	..
	2	...	1	..	1
Operations for Diseases of Pancreas.					
Cholecystenterostomy for carcinoma of pancreas (secondary anterior gastro-enterostomy for duodenal fistula)	1	...	..	..	1
Diseases of Gall Bladder.					
Cholecystitis	3	...	*3	..	..
" cholelithiasis, calculi in gall bladder	8	7	..	..	1
" cholelithiasis, calculi in gall bladder and cystic duct	2	2	..	..	..
" cholelithiasis and sepsis calculi in gall bladder.	1	...	..	..	1
Pericholecystitis	1	1	..	..	..
Hydrops of gall bladder, cholelithiasis calculi in gall bladder	3	3	..	..	..
" of gall bladder, cholelithiasis calculi in cystic duct.	1	...	..	..	1
Empyema of gall bladder, cholelithiasis calculi in gall bladder and cystic duct	4	3	..	..	1
Cholecystitis, cholelithiasis calculi in gall bladder and common duct	2	...	..	..	2
Calculus in common duct after cholecystectomy	1	1	..	..	..
Gangrenous cholecystitis, cholelithiasis calculi in gall bladder	4	2	..	..	2
" cholecystitis, with perforation abscess and cholelithiasis calculi in gall bladder	1	1	..	..	..
" cholecystitis	1	...	..	..	*1
Cholecystitis, stenosis of cystic duct in abscess of liver	1	...	..	..	1
Empyema of gall bladder, subphrenic abscess and empyema of pleura	1	...	..	1	..
Chronic obstructive jaundice and intestinal obstruction	1	...	..	..	*1
	35	20	3	1	11

* Not operated.

	Total.	Cured.	Improved.	Unimproved.	Died.
Operations on Gall Bladder.					
Cholecystectomy	23	17	..	1	5
Cholecystostomy	5	3	..	..	2
Cholecystectomy and choledochotomy	1	...	..	..	1
Secondary choledochotomy	1	1	..	..	..
2 Cholecystostomies recorded under liver.					
1 Cholecystenterostomy recorded under pancreas.					
	30	21	..	1	8
Diseases of Female Genitals.					
Fibroid uterus	1	1	..	..	..
" " with cystic ovary	1	1	..	..	..
Carcinoma of bladder and uterus	1	...	..	*1	..
Retroflexion of uterus with rectal polyp	1	1	..	..	..
" " " " hemorrhoids	1	1	..	..	..
Hematometra (transferred to gynecological service)	1	...	..	*1	..
" with cicatricial stenosis of os uteri	1	1	..	..	..
Chronic endometritis	3	3	..	..	..
" " with hemorrhoids	1	1	..	..	..
Incomplete abortion	1	1	..	..	..
Ruptured tubal pregnancy	2	2	..	..	..
" " " with pelvic hematocele	1	1	..	..	..
Bilateral pyosalpynx and infected ovarian cyst	1	1	..	..	..
" chronic salpingitis	1	1	..	..	..
Ovarian cyst	1	1	..	..	..
Carcinoma of ovaries and peritoneum	1	...	..	1	..
Tubo-ovarian abscess and appendicitis	1	1	..	..	..
Lacerated perineum	1	1	..	..	..
" " and hemorrhoids	1	1	..	..	..
" cervix and rectocele	1	1	..	..	..
" " and hemorrhoids	1	1	..	..	..
Pelvic abscess	1	1	..	..	..
" exudate	1	*1	..	..	..
Lacerated vagina (transferred to gynecological service)	1	...	..	*1	..
Vaginitis	1	*1	..	..	..
	28	24	..	4	..
Operations on Female Genitals.					
Complete hysterectomy for fibroid uterus	1	1	..	..	..
Hysterectomy and left salpingo-oöphorectomy for fibroid uterus and cystic ovary	1	1	..	..	..
Alexander's operation for retroflexion	2	2	..	..	..
Amputation of cervix for cicatricial stenosis and hematometra	1	1	..	..	..
Curettage of uterus	5	5	..	..	..

* Not operated.

	Total.	Cured.	Improved.	Unimproved.	Died.
Operations on Female Genitals—*(Continued).*					
Salpingo-oöphorectomy for ruptured tubal pregnancy	1	1	..	..	..
Salpingectomy for ruptured tubal pregnancy	1	1	..	..	..
Salpingo-oöphorectomy and posterio-vaginal section for ruptured tubal pregnancy and hematocele	1	1	..	..	..
Complete hysterectomy for bilateral pyosalpynx and infected ovarian cyst	1	1	..	..	..
Right salpingo-oöphorectomy and left salpingectomy for chronic salpingitis (bilateral)	1	1	..	..	..
Salpingo-oöphorectomy for ovarian cyst exploratory laparotomy for carcinoma of ovaries and peritoneum	1	...	..	1	..
Salpingo-oöphorectomy for ovarian abscess	1	1	..	..	..
Trachelorrhaphy	2	2	..	..	..
Perineorrhaphy	2	2	..	..	..
Posterior colporrhaphy	1	1	..	..	..
" vaginal section for pelvic abscess	1	1	..	..	..
Myomectomy for myoma of uterus	1	†1	..	..	..
	25	24	..	1	..
Diseases of Abdominal Wall.					
Fibro-sarcoma of rectus abdominis	1	1	..	..	..
Lipoma of abdominal wall	1	1	..	..	..
Abscess " " "	1	1	..	..	..
Partial rupture of rectus abdominis	1	*1	..	..	..
Cicatricial contraction of abdomen and thigh from burn	1	1	..	..	..
	5	5	..	..	..
Operations on Abdominal Wall.—TOTAL 4.					
Excision of fibro-sarcoma	1	1	..	..	..
" " lipoma	1	1	..	..	..
Incision and drainage of abscess	1	1	..	..	..
Plastic operation for cicatricial contraction of abdomen and thigh	1	1	..	..	..
Hernia.—OPERATIONS 84, DEATHS 4.					
Inguinal	36	35	..	*1	..
" and varicocele	1	1	..	..	..
" " undescended testicle	3	3	..	..	..
" inflamed	1	1	..	..	..
" and inferior dental neuralgia	1	1	..	..	..
" " infected hydrocele	1	1	..	..	..
" strangulated	2	2	..	..	..
" " (Littre's)	1	...	..	..	1
" " and hydrocele and hypertrophied prostate	1	...	..	..	1

* Not operated.
†Case recorded under appendix.

Hernia—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Inguinal, double	10	9	..	*1	..
" " and undescended testicle	1	1	..	..	..
" " and hemorrhoids	1	1	..	..	..
" " and lipoma of shoulder	1	1	..	..	..
" " and unilateral hydrocele	1	1	..	..	..
" " and femoral and Hesselbach's hernias	1	..	..	*1	..
Femoral	6	6	..	..	..
" strangulated	2	1	..	..	*1
" double	1	1	..	..	..
Ventral	6	5	..	*1	..
" traumatic	1	1	..	..	..
" " strangulated	1	1	..	..	..
" strangulated	2	1	..	..	1
" and chronic appendicitis	1	1	..	..	..
Umbilical	1	1	..	..	..
" incarcerated	1	1	..	..	..
	84	76	..	4	4
Operations for Hernia.—OPERATIONS 93, DEATHS 3.					
Inguinal Hernia.—Radical operation (Bassini)	†64	64	..	..	..
Radical operation (Halstead)	‡4	4	..	..	..
Herniotomy and radical cure (Bassini) for strangulated inguinal hernia	3	2	..	..	1
Exploratory laparotomy and reduction of strangulated Littre's hernia	1	..	..	..	1
Femoral Hernia.—Radical operation (Moschcowitz)	3	3	..	..	..
Radical operation (Lenhard)	§3	3	..	..	..
" " (Bassini)	1	1	..	..	..
" " (Fibricius)	1	1	..	..	..
Herniotomy and resection of gangrenous intestine for strangulated femoral hernia	1	1	..	..	..
Ventral Hernia.—Radical operation for ventral hernia	7	7	..	..	..
Herniotomy and radical cure for strangulated ventral hernia	1	1	..	..	..
Herniotomy and resection of gangrenous intestine for strangulated ventral hernia	2	1	..	..	1
Umbilical Hernia.—Radical operation for umbilical hernia	2	2	..	..	..
Diseases of Kidney and Ureter.—TOTAL 24, DEATHS 3.					
Hydronephrosis and acute catarrhal appendicitis	1	1	..	..	..
Pyonephrosis and nephrolithiasis	2	1	..	..	1

* Not operated.
† 11 operations bilateral.
‡ 2 operations bilateral.
§ 1 operation bilateral.

Diseases of Kidney and Ureter—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Pyonephrosis and perinephric abscess	1	...	1	..	..
Perinephric abscess	1	1	..	..	..
Pyelonephritis and anuria	1	...	*1	..	..
Tuberculous kidney	2	...	..	*2	..
" " and ureter	1	...	..	..	1
" " and ureter and testis	1	...	1	..	..
" horseshoe kidney	1	...	..	*1	..
" pyonephrosis	1	...	..	*1	..
Renal calculus	4	3	..	*1	..
Hypernephroma of kidney	1	...	..	..	1
Endothelioma and carcinoma of kidney	1	...	..	1	..
Perinephritis	1	1	..	..	..
Nephroptosis (bilateral)	1	1	..	..	..
" and chronic appendicitis	1	1	..	..	..
" " chronic nephritis	1	...	1	..	..
Nephralgia	2	*1	*1	..	..
Operations on Kidney and Ureter.—OPERATIONS 17, DEATHS 3.					
Nephrotomy	6	5	1	..	..
Nephrectomy	4	1	..	1	2
" and partial ureterectomy	1	...	1	..	..
" ureterectomy and cystotomy	1	...	..	..	1
Nephropexy	2	1	1	..	..
" double	1	1	..	..	..
Nephrolysis for perinephritis	1	1	..	..	..
Exploration of kidney, nephrolysis and nephropexy for nephralgia	1	†1	..	..	..
Diseases of Perineum and Male Genitals. TOTAL 120, DEATH 1.					
Foreign body in bladder	1	1	..	..	..
Vesical calculus	2	2	..	..	..
Tumor of bladder	1	...	..	*1	..
Carcinoma of bladder and ureter	1	1	..	..	..
Rupture of bladder	1	...	..	..	1
Incontinence of bladder	1	...	1	..	..
Hematuria	1	*1	..	..	..
Hypertrophied prostate	3	1	*2	..	..
" " and vesical calculus	1	1	..	..	..
Prostatic abscess	1	*1	..	..	..
Hydrocele	2	2	..	..	..
Gumma of testis	1	*1	..	..	..
Varicocele	2	2	..	..	..

* Not operated.
†Case recorded under appendix.

Diseases of Perineum and Male Genitals—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Traumatic hypospadias	1	...	..	*1	..
Urethral fistula	2	...	*1	1	..
" stricture	2	2	..	..	..
" " and urethral fistula	1	1	..	..	..
Phimosis	1	1	..	..	..
Paraphimosis	1	1	..	..	..
Carcinoma of rectum	11	7	2	*2	..
Ischio-rectal abscess	7	7	..	..	..
Fistula in ano	16	15	..	*1	..
" " " and perineal abscess	1	1	..	..	..
Stricture of rectum (inflammatory)	1	...	..	*1	..
Ulcer of rectum	1	1	..	..	..
Prolapse of rectum	2	2	..	..	..
Tuberculosis of rectum and anus	1	...	..	1	..
Hemorrhoids	45	44	..	*1	..
" and fistula in ano	4	4	..	..	..
" " prolapse of rectum	1	1	..	..	..
" " perineal eczema	1	...	1	..	..
Fissure in ano	3	3	..	..	..
Operations on Perineum and Male Genitals.					
OPERATIONS 118, DEATHS 2.					
Extraction of foreign body in bladder for urethra	1	1	..	..	..
Supra-pubic cystotomy for vesical calculus	2	2	..	..	..
Resection of one-half of bladder and terminal inch of ureter for carcinoma	1	1	..	..	..
Exploratory laparotomy for rupture of bladder	1	...	..	..	1
Paraffin injection for incontinence of bladder	1	...	1	..	..
Perineal prostatectomy for hypertrophied prostate	1	1	..	..	..
" cystotomy and prostatectomy for hypertrophied prostate and vesical calculus	1	1	..	..	..
Hinkleman for hydrocele	1	1	..	..	..
Von Bergman for hydrocele	1	1	..	..	..
Excision of veins for varicocele	2	2	..	..	..
Plastic for urethral fistula	1	...	..	1	..
Int. and ext. urethrotomy for urethral stricture	2	2	..	..	..
" " " " " " and fistula	1	1	..	..	..
Circumcision for phimosis	1	1	..	..	..
" " paraphimosis	1	1	..	..	..
Radical operation for carcinoma of rectum:					
a. sacral route	2	2	..	..	..
b. perineal route	3	3	..	..	..
c. vaginal route	2	2	..	..	..
Secondary suture of perineum after radical operation for carcinoma of rectum	1	1	..	..	..

* Not operated.

Operations on Perineum and Male Genitals—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Incision and drainage for ischio-rectal abscess	8	8	..	..	..
Excision of fistula in ano	13	13	..	..	..
Incision and currettage of fistula in ano	7	7	..	..	..
Excision of rectal ulcer	1	1	..	..	..
Whitehead operation for prolapse rectum	1	1	..	..	..
Linear cauterization for prolapse rectum	1	1	..	..	..
Curettage and Pacquelinization of tuberculous ulcers of rectum	1	...	..	1	..
Clamp and cautery for hemorrhoids	49	49	..	..	..
" cautery and ligature for hemorrhoids	1	1	..	..	..
" and cautery for hemorrhoids and prolapse of rectum	1	1	..	..	..
Ligature operation for hemorrhoids	1	1	..	..	..
Excision of eczematous hemorrhoidal tabs	1	...	1	..	..
Cauterization of fissure in ano	3	3	..	..	..
Excision of rectal polyp	1	1	..	..	..
Suprapubic prostatectomy	1	...	..	..	†1
Orchidectomy for undescended testes	2	†2	..	..	..
Diseases of Upper Extremity.—TOTAL 38.					
Shoulder.—Contusion of shoulder and face	1	*1	..	..	..
Lipoma	2	2	..	..	..
Shoulder Joint.—Old dislocation of humerus	1	1	..	..	..
Dislocation of humerus	1	*1	..	..	..
Clavicle.—Tuberculosis of	1	1	..	..	..
Fracture of	1	...	*1	..	..
Sarcoma of	1	1	..	..	..
Axilla.—Tuberculosis of axillary glands	1	1	..	..	..
Suppurative axillary adenitis	1	1	..	..	..
Abscess of axilla	1	1	..	..	..
Laceration of brachial plexus (at birth)	1	...	..	*1	..
Arm.—Periendothelioma of epitrochlear gland with axillary metastasis	1	1	..	..	..
Burns of third degree of arm	1	1	..	..	..
Humerus.—Fracture of surgical neck	1	...	*1	..	..
Osteomyelitis of (acute)	2	1	1	..	..
Necrosis of	1	1	..	..	..
Sarcoma of	1	...	..	*1	..
Forearm.—Furuncle of	1	1	..	..	..
Contusion of	1	*1	..	..	..
Tuberculosis of fascia of	1	1	..	..	..
Exuberant callus of radius	1	1	..	..	..
Radius and ulna.—Compound comminuted fracture of	1	...	*1	..	..
Ununited fracture of with phlegmon of forearm	1	...	1	..	..
Ununited fracture of radius and ulna	1	1	..	..	..
Elbow Joint.—Suppurative arthritis of	1	1	..	..	..
Tuberculosis of both	1	1	..	..	..

* Not operated.
†Cases recorded under hernia.

Diseases of Upper Extremity—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Hand.—Recurrent fibro-sarcoma of	1	1	..	..	..
" " " same case	1	1	..	..	..
Chronic osteomyelitis of head of second metacarpal bone	1	1	..	..	..
Cellulitis of	2	2	..	..	..
Phlegmon of	3	3	..	..	..
Fingers.—Severed flexor tendons of index finger	1	1	..	..	..
Osseous tuberculosis (ulna, metacarpal and metatarsal bones)	1	1	..	..	..
Operations on Upper Extremity.—OPERATIONS 40, DEATHS 1.					
Extirpation of lipoma of shoulder	2	2	..	..	..
" " periendothelioma of epitrochlear gland and axillary metastases	1	1	..	..	..
" " recurrent fibro-sarcoma of hand	1	1	..	..	..
Resection of clavicle for tuberculosis	1	1	..	..	..
" " outer third of clavicle for sarcoma	1	1	..	..	..
" " elbow joint for suppurative arthritis	1	1	..	..	..
" " lower end of humerus of tuberculous osteomyelitis	1	1	..	..	..
" " second metacarpal for chronic osteomyelitis.	1	1	..	..	..
Amputation in forearm for recurrent fibro-sarcoma of hand	1	1	..	..	..
Suture of radius and ulna for ununited fracture	1	1	..	..	..
Reduction of dislocation of humerus	1	1	..	..	..
Open reduction of old dislocation of humerus	1	1	..	..	..
Osteotomy and drainage for acute osteomyelitis of humerus.	3	2	1	..	..
Secondary osteotomy and drainage for chronic osteomyelitis of humerus	2	1	1	..	..
Osteotomy for exuberant callus of radius	1	1	..	..	..
Sequestrectomy and drainage for necrosis of humerus	1	1	..	..	..
Sequestrectomy and drainage for necrosis of ulna	2	2	..	..	..
Sequestrectomy and drainage for necrosis of metacarpal bones	1	1	..	..	..
Incision and curettage for tuberculosis of fascia of forearm.	1	1	..	..	..
" " " for osteomyelitis of fourth metacarpa-phalangeal joint	1	1	..	..	..
" " drainage of abscess of shoulder	1	1	..	..	..
" " " of tuberculous abscess of axilla	1	1	..	..	..
" " " for suppurative axillary adenitis	1	1	..	..	..
" " " of furuncle of forearm	1	1	..	..	..
" " " of phlegmon of forearm	1	1	..	..	..
" " " of cellulitis of hand	2	2	..	..	..
" " " of phlegmon of hand	3	3	..	..	..
Curettage of axillary sinuses	1	1	..	..	..
Tenoplasty for divided flexor tendons	1	1	..	..	..
Skin graft	2	2	..	..	..
Arthotomy and drainage of shoulder joint for pyarthrosis	1	...	..	..	*1

* Death recorded under Lower Extremity.

Diseases of Lower Extremity.—TOTAL 125, DEATHS 7.	Total.	Cured.	Improved.	Unimproved.	Died.
Paralysis after anterior poliomyelitis	1	...	1	..	..
Contracture after Mayo operation on knee	1	...	*1	..	..
Groin.—Inguinal adenitis	1	1	..	..	..
Femoral adenitis (suppurating)	1	1	..	..	..
Foreign body (silk suture) in groin after hernia op.	1	1	..	..	..
Cysto-sarcoma of groin	1	1	..	..	..
Metastatic carcinoma of inguinal glands and liver	1	...	..	*1	..
Gluteal abscess	1	...	1	..	..
" sinus myocarditis	1	...	..	..	*1
Hip Joint.—Tuberculosis of	2	...	..	*2	..
Contusion of	1	*1	..	..	..
Coxa vara	1	...	..	*1	..
Thigh.—Sarcoma of	2	1	..	..	1
Cicatricial contractions of thigh from burns	1	1	..	..	..
Traumatic ablation of left thigh and right leg	1	*1	..	..	..
Crushed wound of lower extremity with sepsis	1	...	..	..	1
Hematoma of	2	2	..	..	..
" " (infected)	1	1	..	..	..
Phlegmon of	1	1	..	..	..
Sinuses of thigh after abscess	1	1	..	..	..
Femur.—Syphilitic osteomyelitis of	1	...	*1	..	..
Tuberculous osteomyelitis of great trochanter	1	1	..	..	..
Acute osteomyelitis of	1	...	..	..	1
" " of femur and tarsus	1	...	1	..	..
" " of femur and radius	1	...	..	..	*1
" " of femur with suppurative gonitis	2	2	..	..	..
" epiphysitis of femur with suppurative gonitis	1	1	..	..	..
Fracture of neck of femur	5	*2	*1	*2	..
" " shaft of femur	3	*3	..	..	..
Patella.—Osteomyelitis of, with suppurative gonitis	1	1	..	..	..
Fracture of	1	1	..	..	..
Refracture of	1	1	..	..	..
Knee Joint.—Genu valgum	1	...	..	*1	..
Genu valgum and anterior curvature of tibia	1	...	1	..	..
Prepatellar bursitis	1	1	..	..	..
Tuberculosis of	4	2	*1	*1	..
Gumma of	1	1	..	..	..
Syphilitic inflammation of	1	1	..	..	..
Chronic bicipital bursitis	1	1	..	..	..
Ulcer over knee	1	...	*1	..	..
Hemarthrosis of knee	1	1	..	..	..
Gonorrheal arthritis	1	...	..	*1	..
Thickened ligamenta claria	1	1	..	..	..
Vicious ankylosis of	1	1	..	..	..
Chronic periarthritis of	1	*1	..	..	..

* Not operated.

Diseases of Lower Extremity—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Tibia.—Acute osteomyelitis of	3	2	1	..	..
Chronic osteomyelitis of	3	3	..	..	..
" " " with post-operative infection of knee joint	2	2	..	..	..
" bone abscess of	1	1	..	..	..
Necrosis of	1	...	..	*1	..
Fracture of	2	*2	..	..	..
Osteoma of	1	1	..	..	..
Osteo-sarcoma of	1	...	..	*1	..
Fibroma of	1	1	..	..	..
Fibula.—Osteomyelitis of	1	1	..	..	..
Sarcoma of	2	1	..	1	..
Tibia and Fibula.—Fracture of	1	*1	..	..	..
Fracture of, compound	1	*1	..	..	..
Potts' fracture	4	*4	..	..	..
Leg.—Ulcer of	2	*2	..	..	..
" " (syphilitic)	2	*2	..	..	..
" " (carbolic)	1	*1	..	..	..
Carbolic necrosis of leg with pyemia	1	...	..	..	1
Gangrene of, embolic	1	1	..	..	..
" " (infected) thrombotic	1	...	..	..	1
Phlegmon of, with abscess of buttock	1	1	..	..	..
Abscess of leg and groin	1	1	..	..	..
Persistent sinus in amputation stump	1	1	..	..	..
Ankle Joint.—Sprain of	2	*2	..	..	..
Compound comminuted fracture of	1	1	..	..	..
" dislocation of	1	1	..	..	..
Foot.—Acute osteomyelitis of tarsus	1	1	..	..	..
Acute osteomyelitis of first metacarpal and first phalanx.	1	1	..	..	..
Gangrene of, arteriosclerotic	1	1	..	..	..
" " diabetic	1	1	..	..	..
Erythromelalgia	2	1	..	*1	..
Tuberculosis of tarsal bones	1	1	..	..	..
Distorsion of foot	1	*1	..	..	..
Pesvalgus paralyticus	1	1	..	..	..
Sarcoma of plantar fascia	1	1	..	..	..
Phlegmon of	1	1	..	..	..
Infected wound of	1	1	..	..	..
Exostosis of first metacarpal	1	1	..	..	..
Leg and Foot.—Phlegmon of	1	1	..	..	..
Veins.—Varicose of leg	3	2	*1	..	..
Thrombo phlebitis of leg	1	1	..	..	..
Crural phlebitis	1	*1	..	..	..
Toes.—Gangrene, arteriosclerotic	6	*1	*3	*2	..
Gangrene, diabetic	1	1	..	..	..
Granulating wound of toe	1	*1	..	..	..
Subluxation of toes	1	1	..	..	..

* Not operated.

	Total.	Cured.	Improved.	Unimproved.	Died.
Operations on Lower Extremity.—TOTAL 98, DEATHS 5.					
Osteotomy and drainage for acute osteomyelitis of femur	1	1	..	..	..
" " " " " " of tibia	3	2	1	..	..
" " " " " " of patella	1	1	..	..	..
" " " " " " of fibula	1	1	..	..	..
" " " " " " of tarsus	1	1	..	..	..
" " " (Neuber) for chronic osteomyelitis of tibia	3	2	..	1	..
" " " (Bier) for chronic osteomyelitis of tibia	1	1	..	..	..
" " " for chronic osteomyelitis	1	1	..	..	..
" " " for tuberculous osteomyelitis of great trochanter	1	1	..	..	..
Sequestrectomy and drainage for chronic osteomyelitis of femur	2	1	1	..	..
Sequestrectomy and drainage for chronic osteomyelitis of tarsus	1	1	..	..	..
Osteotomy for bilateral anterior curvature of tibia	1	...	1	..	..
" " osteoma of tibia	1	1	..	..	..
" " fibroma of tibia	1	1	..	..	..
" " exostosis of first metatarsal	1	1	..	..	..
Mayo operation for pyarthrosis of knee joint	4	4	..	..	..
Suture of fractured patella	2	2	..	..	..
Amputation of thigh	11	9	..	..	2
" " leg	1	1	..	..	..
" " toes for subluxation	1	1	..	..	..
Pirogoff amputation for gangrene of toe	1	1	..	..	..
Exarticulation at knee	4	4	..	..	..
" " ankle	1	1	..	..	..
Resection of knee joint for tuberculosis	1	1	..	..	..
" " " " " vicious ankylosis	1	1	..	..	..
Arthrodesis of knee joint for paralysis after anterior poliomyelitis	1	...	1	..	..
Arthrodesis of ankle joint for paralysis after anterior poliomyelitis	1	...	1	..	..
Partial arthrectomy for syphilis of knee joint	1	1	..	..	..
Osteoplastic operation and tenotomy for pes valgus paralyticus	1	1	..	..	..
Extirpation of inguinal glands	1	1	..	..	..
" " cysto-sarcoma of groin	1	1	..	..	..
" " sarcoma of thigh	1	1	..	..	..
" " prepatella bursa	1	1	..	..	..
" " gummatous bursa of knee	1	1	..	..	..
" " chronically inflamed bicipital bursa	1	1	..	..	..
" " sarcoma plantar fascia	1	1	..	..	..
Excision of varicose veins of leg	2	2	..	..	..
" " ulcer of leg	1	1	..	..	..

Operations on Lower Extremity—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
" " first metacarpal and first phalanx of toe for osteomyelitis	1	1	..	..	..
" " thickened ligamentum alaria	1	1	..	..	..
" " foreign body in groin	1	1	..	..	..
Incision and drainage of gluteal abscess	4	3	1	..	..
" " " " suppurative femoral adenitis	1	1	..	..	..
" " " " knee joint for suppurative arthritis	1	...	..	..	†1
" " " " hematoma of thigh	3	3	..	..	..
" " " " phlegmon of thigh	1	1	..	..	..
" " " " inguinal abscess	1	1	..	..	..
" " " " abscess of thigh	3	2	..	..	‡1
" " " " phlegmon of leg	2	2	..	..	..
" " " " phlegmon of foot	2	2	..	..	..
" " " " infected wound of leg	1	1	..	..	..
" " " " thrombo-phlebitis of leg	1	1	..	..	..
" " " " abscess of leg	1	1	..	..	..
" " " " abscess of groin	1	1	..	..	..
" " curettage for tuberculosis of tarsus	1	1	..	..	..
" " insertion of radium tube for sarcoma of fibula.	1	...	..	1	..
Exploratory incision for sarcoma of thigh	1	...	..	..	1
Plastic operation for cicatrices of thigh from burns	1	1	..	..	..
Tenotomy	1	1	..	..	..
Revision of sinuses of thigh or leg in amputation stumps	4	4	..	..	..
Revision of ankle joint for suppurative arthritis	1	...	1	..	..
Partial suture and drainage for compound comminuted fracture of ankle joint	1	1	..	..	..
Aspiration and evacuation of knee joint for hemarthrosis	1	1	..	..	..
Diseases of Pelvis and Spine.—TOTAL 15, DEATHS 2.					
Dermoid cyst of sacral region	1	1	..	..	..
" " " " " (suppurating)	3	3	..	..	..
Suspected tumor of spinal cord	1	...	..	1	..
Fracture of spinous process of dorsal vertebra	1	*1	..	..	..
Tuberculosis of cervical spine	1	...	..	*1	..
" " dorsal spine with transverse myelitis	1	...	..	..	1
" " lumbar spine with abdominal sinuses	1	...	..	..	1
Tuberculous psoas and inguinal abscesses	1	...	1	..	..
Retroperitoneal pelvic abscess	1	1	..	..	..
" lumbar abscess	1	1	..	..	..
Osteomyelitis of symphysis pubis	1	1	..	..	..
Coccygodynia	1	1	..	..	..
Sacro-iliac synchondritis	1	...	..	*1	..
Operations on Pelvis and Spine.—OPERATIONS 12, DEATHS 2.					
Excision of dermoid cyst of sacral region	1	1	..	..	..

* Not operated.
†Was case of osteomyelitis.
‡Same death recorded under amputation of thigh.

Operations on Pelvis and Spine—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Excision and drainage of cyst of sacral region	3	3	..	..	..
Laminectomy for suspected tumor of spinal cord	1	...	..	1	..
" and drainage for tuberculosis of dorsal spine and transverse myelitis	1	...	..	..	1
Incision and dilatation of abdominal sinuses from tuberculosis of lumbar spine	1	...	..	..	1
Aspiration and iodoform injection of tuberculous psoas and inguinal abscesses	1	...	1	..	..
Incision and drainage of retroperitoneal pelvic abscess	1	1	..	..	..
" " " of retroperitoneal lumbar abscess	1	1	..	..	..
" " " for osteomyelitis of symphisis pubis with abscess	1	1	..	..	..
Excision of coccyx for coccygodynia	1	1	..	..	..
Unclassified Diseases.—TOTAL 43, DEATHS, 2.					
Severe burns of extremities	1	...	*1	..	..
Extensive burns of trunk and extremities	1	...	..	..	*1
Eczema	1	*1	..	..	..
Erysipelas	1	...	..	*1	..
Furunculosis	1	...	1	..	..
Carbuncles of back and buttocks	1	1	..	..	..
Acute gastritis	1	*1	..	..	..
Gastric neurosis	1	*1	..	..	..
Enteroptosis	1	...	..	*1	..
Typhoid fever (transferred to medical ward)	3	...	*1	*2	..
Hernia? (history of hernia, but none seen)	1	...	..	*1	..
Intra-abdominal abscess	1	1	..	..	..
Coprostasis	4	*2	*2	..	..
" and colitis	1	...	*1	..	..
" and left fermoral hernia	1	...	*1	..	..
Colitis	3	...	*2	*1	..
Retroperitoneal sarcoma	1	...	..	1	..
Tuberculous peritonitis	1	*1	..	..	..
Follicular tonsillitis	1	*1	..	..	..
Thyroid asthma with pleuritic effusion	1	...	..	1	..
Pulmonary tuberculosis	1	...	..	*1	..
Rheumatic lumbar neuralgia	1	*1	..	..	..
Lumbar myalgia	1	...	*1	..	..
Acute lymphatic leukemia	1	...	..	..	1
Neurasthenia	1	...	..	*1	..
Pseudo tabes syphilitica	1	...	..	*1	..
Syringomyelia	1	...	..	*1	..
Traumatic myelitis	1	...	..	*1	..
Two charts of patients who refused examination	2	...	..	*2	..
Acute gastritis	1	*1	..	..	..
Chronic gastritis	1	...	*1	..	..

* Not operated.

Unclassified Diseases—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Gastric neurosis	1	...	*1	..	..
Erysipelas of breast	1	...	..	*1	..
Burns of trunk	1	...	..	*1	..
Mitral insufficiency, abdominal pain and effusion	1	...	..	†1	..
Operations on Unclassified Diseases.—TOTAL 6, DEATH 1.					
Thoracic paracentesis for pleuritic effusion	1	...	..	1	..
Incision and insertion of radium tube for acute lymphatic leukemia	1	...	..	..	1
Incision and drainage of carbuncles	1	1	..	..	..
Excision and incision and drainage of furuncles	1	...	1	..	..
Incision and drainage of intra-abdominal abscess	1	1	..	..	..
Exploratory laparotomy for retroperitoneal sarcoma	1	...	..	1	..

* Not operated.
†Diagnosis of appendicitis made and appendicectomy done.

STATISTICAL REPORT OF THE FIRST SURGICAL DIVISION.

1906.

A. G. GERSTER, M.D.,
ATTENDING SURGEON.

A. A. BERG, M.D., and A. V. MOSCHCOWITZ, M.D.,
ADJUNCT ATTENDING SURGEONS.

Diseases of Head and Neck.—TOTAL 102, DIED 5.	Total.	Cured.	Improved.	Unimproved.	Died.
Scalp.—Lacerated wound of	4	†3	1	..	..
Skull.—Depressed fracture	4	4	..	..	..
Compound depressed fracture	1	1	..	..	..
Brain.—Tumor	2	...	1	1	..
Tumor of cerebellum	1	...	1	..	..
Cerebral abscess following chronic mastoiditis	1	1	..	..	..
Nerves.—Trigeminal neuralgia	1	...	1	..	..
Inferior dental neuralgia	1	...	1	..	..
Face.—Lacerated wounds of face	2	1	..	..	‡1
Burns of face, extremities, chest and abdomen	1	...	..	..	*1
Carcinoma of cheek	2	1	..	*1	..
Periorbital abscess	1	1	..	..	..
Chronic otitis media	1	...	..	..	1
Frontal sinusitis	1	*1	..	..	..
Nose.—Deviated nasal septum and adenoids	5	5	..	..	..
Nasal deformity due to fracture	1	...	1	..	..
Lip.—Hare-lip—cleft palate	1	1	..	..	..
Hare lip	1	1	..	..	..
Upper Jaw.—Cleft palate	2	2	..	..	..
Dentiguous cyst	1	1	..	..	..
Osteo-sarcoma of	1	1	..	..	..
Carcinoma of	1	...	1	..	..
Necrosis of	2	1	1	..	..
Alveolar abscess	1	1	..	..	..
Lower Jaw.—Osteomyelitis of	12	5	5	*2	..
Compound infected fracture of	1	*1	..	..	..
Double fistula of lower jaw	1	1	..	..	..
Sarcoma of lower jaw	2	2	..	..	..

*Not operated. ‡Delirium tremens.
† 2 cases not operated.

Diseases of Head and Neck—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Tonsils.—Adenoids	2	2	..	..	..
Peritonsillar abscess	4	3	1	..	..
Pharynx and Larynx.—Abscess of submaxillary gland	1	1	..	..	..
Tuberculosis of larynx	2	...	..	*1	†1
Carcinoma of larynx	2	...	..	2	..
Lympho-sarcoma of parotid	1	1	..	..	..
Retropharyngeal abscess	2	2	..	..	..
Catarrhal laryngitis sicca	1	*1	..	..	..
Neck.—Abscess of neck (syphilitic)	1	1	..	..	..
Cervical lymph-adenitis	9	9	..	..	..
Phlegmon of neck.	2	1	1	..	..
Carbuncle of neck	2	2	..	..	..
Tuberculous glands of neck	11	8	3	..	..
Double angina ludovici	1	...	..	..	1
Metastatic sarcoma of supraclavicular glands	1	...	..	*1	..
Parenchymatous goitre	1	1	..	..	..
Hypertrophied glands of neck	1	1	..	..	..
Torticollis with spondylitis	1	1	..	..	..
Lipoma of neck	1	1	..	..	..
Thyrohyoid cyst	1	1	..	..	..
Thyro-glossal cyst	1	1	..	..	..
Gunshot wound of neck and face	1	...	..	*1	..
Traumatic aneurism of internal carotid	1	1	..	..	..
Operations on Head and Neck.—OPERATIONS 84, DEATHS 2.					
Osteotomy and drainage for osteomyelitis of inferior maxilla	10	5	5	..	..
" " " for sarcoma of lower jaw	2	2	..	..	..
Bilateral craniotomy for cerebellar tumor	1	...	1	..	..
Curettage for carcinoma of left upper maxilla	1	...	1	..	..
Incision and drainage for periorbital abscess	1	1	..	..	..
Partial resection of superior maxilla for necrosis of superior maxilla	1	1	..	..	..
Excision of epithelioma of face	1	1	..	..	.
Incision and curettage for double fistula of lower jaw	1	1	..	..	..
Incision of alveolar abscess	1	1	..	..	..
Staphylorrhaphy for cleft palate	2	2	..	..	..
Submucous resection of nasal septum for deviated nasal septum	1	1	..	..	..
Resection of superior maxilla for osteo-sarcoma of superior maxilla	1	1	..	..	..
Plastic for hare-lip	1	1	..	..	..
Suture of lacerated wound of scalp and face	1	1	..	..	..
Rhinoplasty for nasal deformity	2	1	1	..	..
Excision of dentiguous cyst	1	1	..	..	..
Exploratory incision for fracture of skull	1	1	..	..	..
Craniotomy and elevation of depressed fragment for depressed fracture of skull	2	2	..	..	..

*Not operated. †Acute edema.

Operations on Head and Neck—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Craniotomy and drainage for compound depressed fracture of skull	1	1	..	..	..
Radical mastoid operation for chronic otitis media	1	...	..	..	1
Craniotomy and ligation of middle meningeal artery for depressed fracture of skull and middle meningeal	1	1	..	..	..
Suturing of lip wound for lacerated lip and contusions and delirium tremens	1	...	..	..	1
Craniotomy and removal of brain tumor	1	...	1	..	..
Osteotomy and drainage of mastoid and incision and drainage of cerebral abscess	1	1	..	..	..
Curettage of infected granulations of scalp wound and excision of jugular for suspected sinus thrombosis	1	1	..	..	..
Ash operation for deviated nasal septum and adenoids	3	3	..	..	..
Sequestrectomy and drainage of necrosis of sup. maxil'a	1	...	1	..	..
Bilateral decompression, operation for cerebral tumor	1	...	..	1	..
Division of branches of trigeminal nerve and insertion of nails into foramina	1	...	1	..	..
Division of inferior dental nerve and plugging of inferior dental canal for neuralgia	1	...	1	..	..
Excision of tubercular glands of neck	7	7	..	..	..
Incision and drainage of abscess of submaxillary gland	1	1	..	..	..
Excision for lympho-sarcoma of parotid gland	1	1	..	..	..
Curettage for adenoids	2	2	..	..	..
Incision and drainage of abscess of neck	2	2	..	..	..
" " " retropharyngeal abscess	2	2	..	..	..
" " " for angina ludovici with tracheotomy	1	.	..	..	1
" " " of cervical lymphadenitis	6	6	..	..	..
" " " of cervical phlegmon	...	...	..	..	..
" " " for tubercular glands of neck	2	...	2	..	..
" " " of peritonsillar abscess	4	3	1	..	..
Excision for hypertrophied glands of neck	2	2	..	..	..
" and drainage for carbuncle of neck	2	2	..	..	..
" for thyrohyoid cyst	1	1	..	..	..
" of thyroglossal cyst	1	1	..	..	..
Curetting and packing for tubercular glands of neck	1	1	..	..	..
Hemithyroidectomy for goitre	1	1	..	..	..
Ligation of internal carotid for traumatic aneurism of internal carotid	1	1	..	..	..
Excision of sternal portion of left sterno-cleido-mastoid muscle	1	1	..	..	..
Excision of lipoma of neck	1	1	..	..	..
Diseases of Thorax.—TOTAL 52. DIED 8.					
Carcinoma of breast	3	2	1	..	..
" " breast (recurrent)	1	...	..	*1	..

*Not operated.

Diseases of Thorax—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Fibroma of breast	2	2	..	..	..
Benign tumor of breast	1	1	..	..	..
Acute suppurative mastitis	6	6	..	..	..
Chronic mastitis	1	1	..	..	..
Adeno-fibroma of breast	2	2	..	..	..
Infected tumor of breast	1	1	..	..	..
Tuberculosis of breast	1	1	..	..	..
Fracture of ribs	1	*1	..	..	..
Empyema	11	8	2	..	1
" sinus	2	2	..	..	..
Burns of chest wall	4	†4	..	..	..
Sarcoma of lung	1	...	..	..	*1
Abscess of lung	1	..	..	..	1
Lobar pneumonia	1	*1	..	..	..
Tuberculosis of ribs	1	...	1	..	..
" " " and sternum	1	*1	..	..	..
" " " sternum and ant. mediastinum	1	...	..	..	1
Stab wound of chest	1	*1	..	..	..
Abscess of chest wall	1	1	..	..	..
Mediastinal tumor	1	...	..	..	*1
Contusion of chest	1	...	*1	..	..
Multiple lung abscess, interlobar pneumonia	1	...	..	..	1
Bronchitis	1	*1	..	..	..
Perichondritic abscess	1	...	..	..	1
Carcinoma of esophagus	3	...	1	*1	*1
Operations on Thorax.—OPERATIONS 37, DEATHS 3.					
Amputation of breast for carcinoma (radical)	3	2	1	..	..
Excision of fibroma of breast	2	2	..	..	..
" " benign tumors of breast	1	1	..	..	..
" " adeno-fibroma of breast	2	2	..	..	..
Partial amputation of breast for infected tumor	1	1	..	..	..
Amputation of breast for tuberculosis	1	1	..	..	..
" " " for chronic mastitis	1	1	..	..	..
Incision and drainage for acute suppurative mastitis	3	3	..	..	..
" " " of abscess of breast	3	3	..	..	..
" " " of empyema	3	2	..	..	1
" " " and resection of rib for empyema	7	6	1	..	..
Resection of sternum for tuberculosis	1	...	..	..	1
Incision and drainage of perichondritic abscess	1	1	..	..	..
" " " of interlobar empyema with lung abscesses	1	...	..	..	1
" " " of abscess of chest wall	1	1	..	..	..
Skin grafting for burns of chest wall	1	1	..	..	..
Gastrostomy for carcinoma of esophagus	1	...	1	..	..

*Not operated. †3 cases not operated.

	Total.	Cured.	Improved.	Unimproved.	Died.
Diseases of Stomach.—TOTAL 28, DIED 4.					
Carcinoma of stomach	15	1	7	†5	2
Ulcer of stomach	6	3	*2	*1	..
Pyloric stenosis	2	1	..	..	1
Gastritis	2	*1	*1	..	..
Peripyloritis	2	1	1	..	..
Perforated gastric ulcer with peritonitis	1	...	..	..	1
Operations on Stomach.—OPERATIONS 20, DEATHS 4.					
Exploratory laparotomy for carcinoma of stomach	3	...	1	1	1
Posterior gastro-enterostomy for carcinoma of stomach	6	1	3	1	1
Gastrostomy for carcinoma of stomach	3	...	3	..	..
Exploratory laparotomy for gastric ulcer	1	1	..	..	..
Posterior gastro-enterostomy for gastric ulcer	2	1	1	..	..
Laparotomy for perforated gastric ulcer with peritonitis	1	...	..	..	1
Posterior gastro-enterostomy for pyloric stenosis	2	1	..	..	1
Exploratory laparotomy for peripyloritis	2	1	1	..	..
Diseases of Intestine.—TOTAL 24, DIED 9.					
Carcinoma of splenic flexure	2	...	..	1	1
Tumor of sigmoid	1	...	1	..	..
Carcinoma of sigmoid	1	...	1	..	..
Suspected tumor of sigmoid	1	1	..	..	..
Carcinoma of descending colon	1	...	..	..	1
Adeno-carcinoma of intestine	1	...	..	1	..
Multiple carcinomatosis of abdomen	1	...	..	..	1
Carcinoma of cecum	1	...	1	..	..
Ileo-coecal tuberculosis	2	...	..	1	1
Entero-colitis	3	‡2	..	*1	..
Coprostasis	9	*8	*1	..	..
" and diabetic coma	1	...	..	..	*1
Typhoid perforation	1	...	..	..	1
Incomplete intestinal obstruction by adhesions	1	1	..	..	..
Chronic intestinal obstruction by pelvic tumor	1	...	..	1	..
Acute intestinal obstruction due to volvulus	1	1	..	..	..
Duodenal ulcer	3	1	..	1	1
Amebic colitis	1	...	..	..	1
Retrocolic abscess	1	...	1	..	..
Adherent omentum	2	2	..	..	..
Bullet wound of abdomen	2	1	..	..	1

* Not operated.
† 3 cases not operated.
‡ One not operated.

	Total.	Cured.	Improved.	Unimproved.	Died.
Operations on Intestine.—OPERATIONS 24, DEATHS 9.					
Colostomy for carcinoma of splenic flexure	2	...	..	1	1
" " tumor of sigmoid	1	...	1	..	..
" " carcinoma of sigmoid	1	...	1	..	..
" " adeno-carcinoma of gut	2	...	..	1	1
" " multiple carcinomata of abdomen	1	...	..	..	1
Ileo-colostomy for carcinoma of cecum	1	...	1	..	..
Laparotomy for incomplete intestinal obstruction by adhesions	1	1	..	..	..
" " duodenal fistula	1	...	..	..	1
" " intussusception and peritonitis	1	...	..	..	1
" " acute intestinal obstruction (volvulus)	1	1	..	..	..
" and intestinal suture for bullet wound of abdomen	2	1	..	..	1
Suture of typhoid perforation	1	...	..	..	1
Posterior gastro-enterostomy for duodenal ulcer	1	1	..	1	..
Incision and drainage of multiple abscesses due to tuberculosis	1	...	..	..	1
Incision and drainage of retrocolic abscess	1	1	..	..	..
Resection of cecum for tuberculosis	1	...	..	1	..
Exploratory laparotomy for suspected tumor of gut	1	1	..	..	..
" " for ulcerative amebic colitis	1	...	..	..	1
Division of adherent omentum	2	2	..	..	..
Diseases of Appendix Vermiformis. TOTAL 213, DIED 4.					
Acute catarrhal appendicitis	36	32	*2	*2	..
" appendicitis with abscess	14	14	..	..	..
" gangrenous and perforative appendicitis	24	24	..	..	..
" gangrenous and perforative appendicitis with abscess	38	37	1	..	..
" gangrenous appendicitis with mesenteric thrombosis	1	1	..	..	..
" gangrenous appendicitis with multiple liver abscesses	1	...	..	..	1
" gangrenous appendicitis with subphrenic abscess	2	1	..	..	1
" gangrenous appendicitis with septic intestinal paralysis	1	...	..	..	1
" appendicitis with dry peritonitis	1	1	..	..	..
" appendicitis with seropurulent peritonitis	2	1	..	..	1
" appendicitis with diffuse purulent peritonitis with multiple abscesses	1	1	..	..	..
" hemorrhagic appendicitis with thrombosis of mesentereolum	1	1	..	..	..
" gangrenous appendicitis with multiple abscesses	1	1	..	..	..
" gangrenous appendicitis with seropurulent peritonitis	4	4	..	..	..
" gangrenous appendicitis with purulent peritonitis	13	13	..	..	..
Subacute appendicitis	2	2	..	..	..

* Not operated.

Diseases of Appendix Vermiformis—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Chronic appendicitis	53	51	*1	*1	..
" " with abscess	1	1	..	..	..
Appendicitis?	1	...	*1	..	..
Empyema of appendix	10	10	..	..	..
Appendicular abscess	5	4	..	*1	..
Pelvic abscess following appendicitis	1	1	..	..	..
Operations on Vermiform Appendix.					
OPERATIONS 203, DEATHS 4.					
Appendicectomy for acute catarrhal appendicitis	23	23	..	..	..
" " acute gangrenous appendicitis	1	1	..	..	..
" " subacute appendicitis	2	2	..	..	..
" " chronic appendicitis	45	45	..	..	..
" " empyema of appendix	1	1	..	..	..
" and drainage for acute catarrhal appendicitis	7	7	..	..	..
" " drainage for acute appendicitis with abscess	14	14	..	..	..
" " drainage for acute gangrenous appendicitis	23	23	..	..	..
" " drainage for acute gangrenous appendicitis with abscess	38	37	1	..	..
" " drainage for acute gangrenous appendicitis with mesenteric thrombosis	1	1	..	..	..
" " drainage for acute gangrenous appendicitis with multiple liver abscesses	1	...	..	..	1
" " drainage for acute gangrenous appendicitis and subphrenic abscess	2	1	..	..	1
" " drainage for acute gangrenous appendicitis with septic intestinal paralysis.	1	...	..	..	1
" " drainage for acute gangrenous appendicitis with dry peritonitis	1	1	..	..	..
" " drainage for acute gangrenous appendicitis with sero-purulent peritonitis	2	1	..	..	1
" " drainage for acute gangrenous appendicitis with purulent peritonitis and multiple abscesses	1	1	..	..	..
" " drainage for acute gangrenous appendicitis with multiple abscesses	1	1	..	..	..
" " drainage for acute gangrenous appendicitis with sero-purulent peritonitis	4	4	..	..	..
" " drainage for acute gangrenous appendicitis with purulent peritonitis	13	13	..	..	..
" " drainage for acute hemorrhagic appendicitis with thrombosis of mesenteriolum	1	1	..	..	..

* Not operated

	Total.	Cured.	Improved.	Unimproved.	Died.
Operations on Vermiform Appendix—*(Continued).*					
Appendicectomy and drainage for chronic appendicitis	6	6	..	..	..
" " drainage for chronic appendicitis with abscess	1	1	..	..	..
" " drainage for empyema of appendix	9	9	..	..	..
Incision and drainage of appendicular abscess	4	4	..	..	..
" " " of pelvic abscess	1	1	..	..	..
Diseases of Liver.—TOTAL 10, DIED 2.					
Cirrhosis of liver	2	...	1	1	..
" " " with gastric hemorrhage	1	...	..	..	1
Syphilitic hepatitis	1	...	1	..	..
Gumma of liver	1	...	..	1	..
Liver tumor	1	...	..	1	..
Liver abscess	4	3	..	..	1
Operations on Liver.—OPERATIONS 9, DEATHS 2.					
Exploratory laparotomy for cirrhosis of liver	1	...	..	1	..
" " " gumma of liver	1	...	..	1	..
" " " syphilitic hepatitis	1	...	1	..	..
Incision and drainage of liver abscess	4	3	..	..	1
Posterior gastro-enterostomy for cirrhosis of liver and gastric hemorrhage	1	...	..	..	1
Cholecystostomy for cirrhosis of liver (jaundice)	1	...	1	..	..
Diseases of Pancreas.—TOTAL 1, DIED 0.					
Tumor of pancreas	1	...	..	1	..
Operations on Pancreas. OPERATION 1, DEATH 0.					
Exploratory laparotomy for tumor of pancreas	1	...	..	1	..
Diseases of Gall-Bladder and Ducts. TOTAL 39, DIED 3.					
Acute cholecystitis and cholelithiasis	5	5	..	..	..
Cholelithiasis	7	7	..	..	..
Chronic cholecystitis and cholelithiasis with calculi in common and hepatic ducts	1	1	..	..	..
Chronic cholecystitis and cholelithiasis with common duct stones	1	1	..	..	..
Cholelithiasis (common duct stone) cholemia	1	...	..	..	1
Cholecystitis, cholelithiasis and appendicitis	1	1	..	..	..
Acute gangrenous cholecystitis and cholelithiasis	4	3	..	..	1
Acute empyema of gall-bladder and cholelithiasis	5	5	..	..	..

Diseases of Gall-Bladder and Ducts—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Empyema of gall-bladder, pericholecystitic abscess, cholelithiasis	1	1	..	..	..
Empyema of gall-bladder	1	1	..	..	..
Cholelithiasis stones in hepatic duct	1	1	..	..	..
Cholelithiasis and pericholecystitic abscess	1	1	..	..	..
Cholelithiasis and pregnancy	1	1	..	..	..
Cholecystitis, typhoid and cholangitis	1	...	..	..	*1
Impacted calculus in ampulla of Vater	1	1	..	..	..
Cholecystitis and cholangitis	1	1	..	..	..
Cholangitis	1	...	..	*1	..
Empyema of gall-bladder, tumor of pancreas	1	...	1	..	..
Carcinoma of gall bladder	1	...	..	1	..
Carcinoma of common bile duct	1	...	1	..	..
Adhesions around common duct	1	...	..	*1	..
Catarrhal icterus	1	*1	..	..	..
Operations on Gall-Bladder and Bile Ducts.					
OPERATIONS 35, DEATHS 2.					
Cholecystostomy and drainage for cholelithiasis and pericholecystitic abscess	2	2	..	..	..
Cholecystostomy and drainage for empyema of gall-bladder and cholelithiasis	2	2	..	..	..
Cholecystostomy and drainage for pericholecystitic adhesions, cholangitis and cholecystitis	1	1	..	..	..
Cholecystostomy and drainage for cholelithiasis	1	1	..	..	..
Cholecystostomy and drainage and posterior gastro-enterostomy for tumor of pancreas and empyema of gall-bladder	1	...	1	..	..
Cholecystostomy and choledochotomy for impacted calculus in ampulla of Vater	1	1	..	..	..
Cholecystectomy and drainage for chronic cholecystitis and cholelithiasis	12	12	..	..	..
Cholecystectomy and drainage for cholelithiasis (stone in hepatic duct)	1	1	..	..	..
Cholecystectomy and drainage of common and hepatic ducts for stones and cholecystitis	1	1	..	..	..
Cholecystectomy and choledochotomy for cholelithiasis (calculi in common duct)	1	1	..	..	..
Cholecystectomy and drainage for acute gangrenous cholecystitis and cholelithiasis	4	3	..	..	1
Cholecystectomy and drainage of cystic duct for cholelithiasis stone in common duct	1	1	..	..	..
Cholecystectomy and drainage for acute empyema of gall-bladder and cholelithiasis	4	4	..	..	..

* Not operated.

	Total.	Cured.	Improved.	Unimproved.	Died.
Operations on Gall-Bladder and Bile Ducts— *(Continued).*					
Cholecystectomy and drainage and choledochotomy for cholelithiasis (stones in common duct and cholemia)	1	...	..	..	1
Cholecystectomy and drainage of hepatic duct for malignant growth of common duct	1	...	1	..	..
Exploratory laparotomy and excision of omentum for carcinoma of gall-bladder	1	...	..	1	..
Diseases of Female Genitals.—TOTAL 43, DIED 1.					
Fibroid uterus	10	10	..	..	..
Acute salpingitis	1	1	..	..	..
Double pyosalpinx	2	2	..	..	..
Ectopic pregnancy	6	5	..	..	1
Pyosalpinx	1	1	..	..	..
Endomentritis	2	*2	..	..	..
Lacerated perineum	2	1	..	1	..
Rupture of uterus (traumatic)	1	1	..	..	..
Salpingitis and peritonitis	2	2	..	..	..
Salpingo-oöphoritis	3	*2	*1	..	..
Subinvoluted uterus	1	1	..	..	..
Intraligamentous cyst	1	...	..	*1	..
Parovarian cyst	1	1	..	..	..
Pelvic abscess	2	2	..	..	..
Diseased adnexa with multiple abscesses	1	1	..	..	..
Tumor of ovary	1	1	..	..	..
Prolapse of uterus	2	2	..	..	..
Cyst of canal of Nuck	1	1	..	..	..
Pelvic adhesions	1	...	1	..	..
Ovarian cyst	1	1	..	..	..
Endometritis, rectocele, lacerated cervix	1	1	..	..	..
Operations on Female Genitals.—OPERATIONS 41, DEATHS 2.					
Hysterectomy and double salpingo-oöphorectomy for fibroids.	8	8	..	..	..
Salpingectomy for acute salpingitis	1	1	..	..	..
Bilateral salpingo-oöphorectomy for pyosalpinx	5	5	..	..	..
Salpingo-oöphorectomy for ectopic	5	4	..	..	1
" for diseased adnexa	3	2	..	..	1
Curettage for endometritis	1	1	..	..	..
Hysterectomy for ruptured uterus	1	1	..	..	..
Removal of parovarian cyst	1	1	..	..	..
Posterior vaginal section for pelvic abscess	1	1	..	..	..
Incision and drainage of multiple abscess for diseased adnexa	1	1	..	..	..
Myomectomy	1	1	..	..	..
Oöphorectomy for tumor of ovary	1	1	..	..	..

* Not operated.

Operations on Female Genitals—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Plastic on vaginal outlet	3	3	..	..	..
Ventral fixation	1	1	..	..	..
Bilateral salpingo-oöphorectomy and myomectomy	1	1	..	..	..
Hysterectomy and salpingo-oöphorectomy for ectopic	1	1	..	..	..
Laparotomy and drainage of pelvic abscess	1	1	..	..	..
Excision of cyst of canal of Nuck	1	1	..	..	..
Exploratory laparotomy for pelvic adhesions	1	...	1	..	..
Oöphorectomy for ovarian cyst	1	1	..	..	..
Plastic for lacerated cervix	1	1	..	..	..
Diseases of Abdominal Wall.—TOTAL 4, DIED 0.					
Contusion of abdomen	1	1	..	..	..
Infected wound of abdominal wall	1	*1	..	..	..
Contusion of abdomen and back	1	*1	..	..	..
Intra-abdominal growth	1	...	..	*1	..
Operations on Abdominal Wall.—OPERATION 1, DEATH 0.					
Exploratory laparotomy for suspected intra-abdominal injury	1	1	..	..	..
Miscellaneous					
Stretching sphincter for neurasthenia	1	1	..	..	..
Diseases of Peritoneum.—TOTAL 9, DIED 2.					
Peritonitis of unknown origin	1	...	..	..	*1
Tuberculous peritonitis	3	...	1	*1	1
Retroperitoneal lymphosarcoma	3	...	2	*1	..
Tuberculous mesenteric glands	1	...	..	1	..
Peritoneal adhesions following gastro-enterostomy	1	...	..	*1	..
Operations on Peritoneum.—OPERATIONS 4, DEATH 1.					
Exploratory laparotomy for tuberculous peritonitis	1	...	..	..	1
Exploratory laparotomy for tuberculous peritonitis and double salpingectomy	1	...	1	..	..
Removal of femoral and inguinal glands	1	...	1	..	..
Exploratory laparotomy for retroperitoneal tumor	1	...	1	..	..
Laparotomy and drainage of T. B. C. abscess of mesenteric glands	1	...	..	1	..
Hernia.—TOTAL 115, DIED 4.					
Inguinal	54	52	..	*2	..
" double	18	18	..	..	..

* Not operated.

Hernia—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Inguinal, double and ventral	1	1	..	..	..
" strangulated	8	6	..	..	2
Femoral	11	10	..	*1	..
" double	1	1	..	..	..
" strangulated	4	4	..	..	..
Ventral	13	13	..	..	..
" strangulated	2	1	..	..	1
Hernia, for strangulated ventral, entero-enterostomy	1	...	..	..	1
" " strangulated ventral, resection of gut	1	1	..	..	..
" " strangulated gangrenous umbilical hernia, drainage, entero-enterostomy for fecal fistula following	1	1	..	..	..
" " strangulated umbilical with hysterectomy for fibroids	1	...	..	..	1
" " obturator	1	1	..	..	..
Ventral strangulated with fibroid uterus	1	...	..	..	1
Umbilical strangulated	1	...	1	..	..
Obturator	1	1	..	..	..
Operations for Hernia.—OPERATIONS 111, DEATHS 4.					
Hernia, for ventral	13	13	..	..	..
" Bassini for inguinal	43	43	..	..	..
" Bassini for double inguinal	15	15	..	..	..
" Bassini and modified Halsted for double inguinal	2	2	..	..	..
" modified Halsted for inguinal	8	8	..	..	..
" modified Halsted for double inguinal	1	1	..	..	..
" Bassini for strangulated inguinal	5	5	..	..	..
" Moschcowitz for femoral	10	10	..	..	..
" Moschcowitz for double femoral	1	1	..	..	..
" Bassini for strangulated femoral	2	2	..	..	..
" Lenhardt for femoral	1	1	..	..	..
" Kocher for femoral	1	1	..	..	..
" Bassini for strangulated inguinal and appendicectomy	1	1	..	..	..
" for strangulated gangrenous inguinal	2	...	..	..	2
" for ventral and double inguinal	1	1	..	..	..
Diseases of Kidney and Ureter.—TOTAL 32, DIED 1.					
Pyelitis acute	1	1	..	..	..
Renal calculus	2	2	..	..	..
Perinephritis	1	1	..	..	..
Ureteral calculus	4	3	..	*1	..
Nephralgia	1	...	1	..	..
Perinephritic abscess	4	4	..	..	..
Perinephritis and chronic interstitial nephritis	2	2	..	..	..
Nephroptosis	2	2	..	..	..

* Not operated.

	Total.	Cured.	Improved.	Unimproved.	Died.
Diseases of Kidney and Ureter—*(Continued).*					
Infarct of kidney	2	1	*1	..	..
Hypernephroma	1	...	..	..	1
Bacterial nephritis	1	1	..	..	..
Pyonephrosis	3	1	..	2	..
Carcinoma of kidney	*1	...	..	1	..
Multiple miliary abscesses of kidney	1	1	..	..	..
Pyonephrosis and renal calculi	1	1	..	..	..
Pyelitis gonorrheal	1	*1	..	..	..
Renal colic	2	*1	..	*1	..
Ureteral obstruction	2	...	..	*2	..
Operations on Kidney and Ureter. OPERATIONS 21, DEATH 1.					
Nephrotomy for renal calculus	1	1	..	..	..
" " perinephritis and chronic interstitial nephritis	1	1	..	..	..
" " bacterial nephritis	1	1	..	..	..
" " multiple miliary abscesses	1	1	..	..	..
" exploratory for perinephric adhesions	1	1	..	..	..
Nephrectomy for acute pyelitis	1	‡1	..	..	..
" " hypernephroma	1	...	..	..	1
" " pyonephrosis and calculi	1	1	..	..	..
" " renal calculus	1	1	..	..	..
" " pyonephrosis	1	1	..	..	..
" " perinephritis	1	1	..	..	..
Nephrotomy and incision and drainage of perinephric abscess	1	1	..	..	..
" for infarct of kidney	1	1	..	..	..
Incision and drainage of perinephric abscess	3	3	..	..	..
Nephropexy	2	†2	..	..	..
Extra-peritoneal of ureteral calculus	2	2	..	..	..
Suprapubic cystotomy and incision of ureter for removal of calculus	1	1	..	..	..
Diseases of Perineum and Male Genitals. TOTAL 154, DIED 6.					
Vesical calculus	1	1	..	..	..
Tumor of bladder	2	...	..	*2	..
Cystitis	1	...	..	*1	..
Hypertrophied prostate	5	3	*1	..	1
" " and vesical calculus	2	1	..	..	1
Carcinoma of prostate	1	...	..	..	*1
Urethral calculus (prostatic)	1	1	..	..	..
Stricture of urethra	1	1	..	..	..

* Not operated.
† 1 case was a bilateral operation.
‡ Appendicectomy.

Diseases of Perineum and Male Genitals—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Keloid of meatus	1	...	..	1	..
Hypospadias with acute urethritis	1	...	..	*1	..
Carcinoma of penis	1	1	..	..	..
Paraphymosis	1	1	..	..	..
Varicocele	2	1	..	*1	..
" and hemorrhoids	1	1	..	..	..
Gonorrheal epididymitis	1	...	*1	..	..
Tuberculosis of testicle	1	1	..	..	..
Tumor of spermatic cord	1	1	..	..	..
Thrombosis of vessels of spermatic cord	1	*1	..	..	..
Genito-urinary tuberculosis	1	...	..	*1	..
Carcinoma of rectum	6	2	..	†3	1
Recurrent carcinoma of rectum	3	1	..	‡2	..
Prolapse of rectum	3	3	..	..	..
Rectal polypi	1	...	..	*1	..
Ulcers of rectum	2	2	..	..	..
Stricture of rectum	1	...	..	..	1
Tuberculosis of rectum and anus	1	...	..	*1	..
Otoproctitis	1	...	*1	..	..
Recto-vaginal fistula	1	1	..	..	..
Stricture of anus—recto-vaginal fistula	1	1	..	..	..
Atresia ani—recto-vaginal fistula	1	1	..	..	..
Ulcer of anus	1	1	..	..	..
Fissure in ano	2	1	..	..	..
Hemorrhoids	56	55	..	..	§1
" and endometritis	1	1	..	..	..
" " gangrenous urethritis	1	...	..	1	..
Hemorrhoidal tab	1	1	..	..	..
Fistula in ano	22	18	1	*3	..
" " " tubercular	1	1	..	..	..
" " " ulcer of buttock	1	1	..	..	..
" " " and hemorrhoids	3	3	..	..	..
Ischio-rectal abscess	16	16	..	..	..
Healed ischio-rectal abscess	1	...	..	*1	..
Operations on Perineum and Male Genitals. OPERATIONS 154, DEATHS 5.					
Suprapubic cystotomy for vesical calculus	1	1	..	..	..
" prostatectomy for hypertrophied prostate	4	3	..	..	1
" prostatectomy for hypertrophied prostate and vesical calculus	2	1	..	..	1
Internal urethrotomy for urethral fistula	1	1	..	..	..
Suprapubic cystotomy for prostatic calculus	1	1	..	..	..
Internal and external urethrotomy for stricture	1	1	..	..	..
Excision of keloid of glans penis	1	...	..	1	..

* Not operated. † 2 not operated. ‡ 1 not operated.
§ Meningitis developed and patient died.

Operations on Perineum and Male Genitals—*(Continued)*	Total.	Cured.	Improved.	Unimproved.	Died.
Amputation of penis for carcinoma	1	1	..	..	..
Circumcision for paraphimosis	1	1	..	..	..
Radical cure of varicocele	2	†2	..	..	..
Orchidectomy for tuberculosis of testis	1	1	..	..	..
" " and vasectomy for tumor of spermatic cord	1	1	..	..	..
Radical operation for carcinoma of rectum	2	2	..	..	..
" " (vaginal) for carcinoma of rectum with colostomy for subsequent stricture	1	...	..	..	1
" " with excision of vaginal wall for recurrent carcinoma of rectum	1	1	..	..	..
Excision of specimen for diagnosis (carcinoma)	1	...	..	1	..
Prolapse of rectum, cauterization for	1	1	..	..	..
" " " Allingham's operation for	2	2	..	..	..
Ulcers of rectum, cauterization	2	2	..	..	..
Laparotomy for stricture of rectum	1	...	..	..	1
Incision and drainage and suture of recto-vaginal fistula	1	1	..	..	..
Tait operation for recto-vaginal fistula and stricture of anus	1	1	..	..	..
Perineal section for atresia ani and recto-vaginal fistula	1	1	..	..	..
Ulcer of anus, cauterization	1	1	..	..	..
Fissure in ano, cauterization	1	...	1	..	..
" " " dilatation of sphincter for	1	1	..	..	..
Clamp and cautery for hemorrhoids	51	50	..	..	‡1
" " " and ligature for hemorrhoids	4	4	..	..	..
Excision of hemorrhoidal tab	1	1	..	..	..
Clamp and cautery for hemorrhoids and curettage for endometritis	1	1	..	..	..
Incision and drainage of fistula in ano	14	14	..	..	..
" " " of fistula in ano (tubercular)	1	1	..	..	..
Excision of fistula and suture	4	4	..	..	..
Incision and drainage of fistula with cauterization	1	1	..	..	..
" " " of fistula with secondary suture	1	...	1	..	..
Excision and suture of fistula and clamp and cautery for hemorrhoids	1	1	..	..	..
Incision and drainage of fistula and clamp and cautery for hemorrhoids	1	1	..	..	..
" " " of fistula with ligature of hemorrhoids	1	1	..	..	..
" " " of ischio-rectal abscess	17	17	..	..	..
" " " of ischio-rectal abscess with secondary suture	1	1	..	..	..
Diseases of Upper Extremity.—TOTAL 53, DIED 0.					
Shoulder.—Sarcoma of shoulder	1	...	..	*1	..
Lipoma of	1	1	..	..	..
Dislocation of	2	1	1	..	..

* Not operated.
† 1 case also operated for hemorrhoids.
‡ This case was once attempted previously unsuccessfully.

Diseases of Upper Extremity—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Clavicle.—					
Axilla.—Suppurative adenitis	5	5	..	..	..
Sebaceous cyst of	1	1	..	..	..
Humerus.—Osteomyelitis of humerus	4	4	..	..	..
Fracture of humerus	2	2	..	..	..
Ununited fracture of	2	...	..	2	..
Osteosarcoma of	1	...	..	*1	..
Forearm.—Phlegmon of	6	6	..	..	..
Burn of	2	2	..	..	..
Sarcoma of	1	1	..	..	..
Myxo-fibroma of forearm	1	1	..	..	..
Traumatic arthritis of elbow	1	...	1	..	..
Spindle cell sarcoma of skin of	1	...	1	..	..
Radius and Ulna.—Malunion of fracture of both bones	1	...	1	..	..
Osteomyelitis of humerus, radius and ulna	1	1	..	..	..
" " radius (typhoid)	1	1	..	..	..
Hand.—Phlegmon of hand	4	3	1	..	..
Tubercular tenosynovitis of wrist	4	3	1	..	..
Venous cyst of	1	1	..	..	..
Tuberculosis of wrist	1	...	1	..	..
Multiple tuberculous arthritis	1	...	..	*1	..
Fingers.—Osteomyelitis of metacarpus	1	1	..	..	..
Compound fracture of finger	1	1	..	..	..
Gangrene of index finger	1	1	..	..	..
Necrosis of phalanx of middle finger	1	1	..	..	..
Tuberculosis osteomyelitis of phalanx	1	...	1	..	..
Compound dislocation of middle finger	1	...	1	..	..
Division of extensor tendons of fourth and fifth fingers.	1	1	..	..	..
Carbolic gangrene of thumb	1	1	..	..	..
Cicatricial contraction of hand	1	1	..	..	..
Chronic paronychia	1	...	1	..	..
Diseases of Lower Extremity and Pelvis.—TOTAL 152, DIED 9,					
Toe.—Compound fracture of fifth toe with gangrene	1	1	..	..	..
Sarcoma of	1	1	..	..	..
Arterio-sclerotic gangrene	2	1	..	*1	..
Raynaud's disease	1	...	..	*1	..
Hallux valgus	1	...	..	*1	..
Supernumerary toes	1	1	..	..	..
Foot.—Erythromelalgia	2	...	..	*2	..
Gangrene of foot	1	1	..	..	..
Arterio-sclerotic gangrene of foot	6	3	1	*1	1
Phlebo-sclerotic gangrene of foot and leg	1	1	..	..	..
Traumatic gangrene of foot	1	1	..	..	..
" " of foot; fracture of tibia and fistula	1	1	..	..	..
Diabetic gangrene (coma)	1	...	..	..	1
Phlegmon of	4	3	..	..	1

* Not operated.

Diseases of Lower Extremity and Pelvis—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Osteomyelitis of metatarsus	1	1	..	..	..
Tuberculosis of foot	1	...	..	*1	..
" " tarsus	1	1	..	..	..
Fracture of scaphoid bone	1	*1	..	..	..
Congenital club foot	1	1	..	..	..
Pyarthrosis of ankle joint, pyemia	1	†1	..	..	..
Abscess of ankle	1	1	..	..	..
Tuberculosis of ankle joint	3	1	2	..	..
Traumatic suppurative arthritis of ankle joint	1	1	..	..	..
Leg.—Ulcer of leg	2	*1	*1	..	..
Ulcer of leg—abscess of calf	1	1	..	..	..
Abscess of leg	3	3	..	..	..
Furunculosis of	1	*1	..	..	..
Phlegmon of	1	1	..	..	..
Phlebitis and eczema of	1	*1	..	..	..
Phlebitis of	3	*1	..	*2	..
Thrombosed veins of thigh and leg	2	1	*1	..	..
Thrombo-phlebitis of ext. saphenous with suppuration	1	1	..	..	..
Varicose veins	4	4	..	..	..
Burns of leg	1	*1	..	..	..
Burns of abdomen, leg and arms	1	...	..	..	*1
Contusions of	1	*1	..	..	..
Deformity of—following osteomyelitis	1	...	..	*1	..
Erysipelas—sepsis—phlegmon of calf	1	...	..	1	..
Sinus of leg following amputation	1	...	1	..	..
Tibia and Fibula.—Potts' fracture	2	2	..	..	..
Malunion of fracture of tibia and fibula	1	...	..	*1	..
Fibula.—Conical stump	1	1	..	..	..
Tibia.—Osteomyelitis of tibia (complete necrosis of)	1	1	..	..	..
Chronic osteomyelitis of	3	3	..	..	..
Necrosis of	1	1	..	..	..
Bone abscess of	1	1	..	..	..
Sarcoma of	1	...	..	*1	..
Fracture of	2	2	..	..	..
Knee Joint.—Bilateral prepatellar bursitis	1	1	..	..	..
Acute synovitis of knee joint (septic)	1	1	..	..	..
Pyarthrosis of knee joint	1	1	..	..	..
Hemarthrosis of	1	1	..	..	..
Infected wound of knee	1	1	..	..	..
Abscess of knee	1	1	..	..	..
Tuberculosis of knee joint	6	4	*1	*1	..
Traumatic arthritis of knee	1	*1	..	..	..
Contracture of knee, following burns	1	1	..	..	..
Vicious ankylosis of knee	1	1	..	..	..
Ulcer of knee	1	*1	..	..	..
Ganglion of knee	1	1	..	..	..
Patella.—Sarcoma of	1	...	1	..	..

* Not operated.
† Subsequently died.

Diseases of Lower Extremity and Pelvis—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Femur.—Fracture of neck of	4	2	*2	..	..
Femur—Fracture of, patella, radius and ulna	1	1	..	..	..
Tuberculosis osteomyelitis of	1	1	..	..	..
Osteomyelitis of—suppurative gonitis and sepsis	1	...	..	..	1
" " (bone abscess)	3	3	..	..	..
Enchondroma of	1	1	..	..	..
Chronic osteomyelitis of—chronic gonitis	1	1	..	..	..
Blood cyst of	1	1	..	..	..
Thigh.—Tuberculosis of thigh, scrotum and buttocks	1	...	..	*1	..
Foreign body (needle) in	1	1	..	..	..
Sinus of	1	...	..	*1	..
Fistula of, following operation for femur	1	1	..	..	..
Abscess of	1	1	..	..	..
Lipoma of	1	1	..	..	..
Burns of extremities and trunk	4	*1	..	..	*3
Contractures following burns of	1	1	..	..	..
Contusion of	2	*2	..	..	..
Hip Joint.—Chronic bursitis of	1	1	..	..	..
Contusion of hip and back	2	*2	..	..	..
Groin.—Femoral adenitis	4	4	..	..	..
Lymphadenitis inguinalis	1	1	..	..	..
Abscess of	1	1	..	..	..
Carcinomatous glands of inguinal region	1	...	..	*1	..
Sacrum.—Dermoid cyst of sacral region	2	2	..	..	..
Infected dermoid cyst	1	1	..	..	..
Scar of sacral region	1	*1	..	..	..
Necrosis of sacrum	1	1	..	..	..
Sacral abscess	1	1	..	..	..
Spine, Pelvis and Back.—Potts' disease with pelvic abscess	1	...	1	..	..
Potts' disease with iliac abscess	1	...	..	..	1
" " with abscess of back	1	1	..	..	..
" " with abscess of dorsum	1	...	1	..	..
Melanotic sarcoma of back	1	1	..	..	..
Carbuncle of neck	1	1	..	..	..
Tubercular osteomyelitis of symphysis pubis	1	1	..	..	..
Tuberculosis of ileo-sacral joint	1	...	1	..	..
Osteomyelitis of ileum	1	1	..	..	..
" " pelvis—acute mania	1	...	..	*1	..
Fracture of pelvis	1	*1	..	..	..
" " pubic bone—septic hematoma of pelvis	1	...	..	..	1
Acute osteomyelitis of lumbar vertebræ	1	1	..	..	..
Miscellaneous.—TOTAL 16, DIED 1.					
Erysipelas	4	...	*1	*3	..
Neurasthenia	2	*1	1	..	..
Hodgkin's disease	2	...	..	2	..
Gout	1	...	*1	..	..

* Not operated.

Miscellaneous—*(Continued).*	Total.	Cured.	Improved.	Unimproved.	Died.
Chronic rheumatism	1	...	..	1	..
Septicemia of unknown origin	2	...	..	*1	*1
Chorea and chronic endocarditis	1	...	*1	..	..
Tertiary syphilis	1	...	*1	..	..
Bromide eruption	1	...	*1	..	..
Scar following removal of ranula	1	...	..	*1	..
Operations on Upper Extremity. OPERATIONS 48, DEATHS 0.					
Excision of subaceous cyst of axilla	1	1	..	..	..
" " lipoma of shoulder	1	1	..	..	..
" " tenosynovitis of wrist (tubercular	4	3	1	..	..
" " venous cyst	1	1	..	..	..
" " myxo-sarcoma of forearm	1	1	..	..	..
" " spindle cell sarcoma of elbow	1	...	1	..	..
Incision and drainage of phlegmon of arm	7	7	..	..	..
" " " of axillary adenitis	6	6	..	..	..
" " " of phlegmon of hand	4	3	1	..	..
Incision and drainage of compound dislocation of middle finger	1	...	1	..	..
Osteotomy for osteomyelitis of humerus	4	4	..	..	..
" " tubercular osteomyelitis of phalanx	1	...	1	..	..
Removal of callus of mal-united fracture of radius and ulna.	1	...	1	..	..
Wiring fragments of ununited fracture of humerus	1	...	..	1	..
Amputation of middle finger for necrosis of phalanx	1	1	..	..	..
Reefing of capsule by suture for dislocation of shoulder	1	1	..	..	..
Tenoplasty for cut extensor tendons fourth and fifth fingers.	1	1	..	..	..
Amputation of finger for chronic osteomyelitis	1	1	..	..	..
Bier amputation of lower third of humerus for sarcoma	1	1	..	..	..
Open operation for dislocation of shoulder	1	...	1	..	..
Reduction of fracture of humerus	1	1	..	..	..
Incision and drainage of sinus of elbow and resection of elbow joint for osteomyelitis of humerus, radius and ulna	1	1	..	..	..
Compound fracture of finger	1	1	..	..	..
Amputation of index finger for gangrene	1	1	..	..	..
Intermedullary splint for ununited fracture of humerus	1	1	..	..	..
Plastic on hand for cicatricial contracture	1	1	..	..	..
Breaking up adhesions for traumatic arthritis of elbow	1	...	1	..	..
Osteotomy for osteomyelitis of radius	1	1	..	..	..
Operations on Lower Extremity and Pelvis. OPERATIONS 105, DEATHS 6.					
Amputation of supernumerary toes	1	1	..	..	..
" " toe for compound fracture and gangrene	1	1	..	..	..
" " toe and removal of femoral glands for sarcoma	1	1	..	..	..

* Not operated.

Operations on Lower Extremity and Pelvis—*(Continued)*	Total.	Cured.	Improved.	Unimproved.	Died.
Gruty amputation for arterio-sclerotic gangrene of toes	3	3	..	..	..
Amputation of thigh (middle third) osteoplastic	1	1	..	..	..
" " thigh for phlebo-sclerosis	1	1	..	..	..
Curettage of ulcerated area for arterio-sclerotic gangrene of foot	1	...	1	..	..
Amputation of thigh for arterio-sclerotic gangrene	1	1	..	..	..
" of thigh for arterio-sclerotic gangrene and incision and drainage of secondary abscess	1	...	..	..	1
Pirogoff amputation for traumatic gangrene	1	1	..	..	..
Amputation of foot with secondary skin suture for traumatic gangrene of foot and fracture of tibia and fibula	1	1	..	..	..
Gruty amputation for diabetic gangrene	1	...	..	..	1
Amputation through upper third of leg for multiple abscess and suppurating arthritis of ankle joint	1	1	..	..	..
Incision and drainage of phlegmon of foot	3	2	..	..	1
Amputation of fourth phalanx for osteomyelitis of metatarsus	1	1	..	..	..
Curettage of tuberculous sinuses of leg	1	1	..	..	..
Partial astragalectomy and removal of scaphoid for congenital club foot	1	1	..	..	..
Incision and drainage of abscess of ankle joint	1	1	..	..	..
Multiple incisions for T.B.C. of ankle joint, curetting of ankle	1	...	1	..	..
Incision and drainage of tuberculous sinus of ankle	1	1	..	..	..
Amputation of leg for gangrene of foot following suppurative arthritis of ankle joint	1	1	..	..	..
Incision and drainage of leg following amputation	1	...	1	..	..
" " " " abscess of calf	2	1	..	1	..
" " " " abscess of leg	4	4	..	..	..
Multiple incisions for thrombo-phlebitis of ext. saphenous vein with suppuration	1	1	..	..	..
Excision of varicose veins of leg	4	4	..	..	..
Reduction of Potts' fracture	2	2	..	..	..
Osteoplastic amputation of fibula for conical stump	1	1	..	..	..
Osteotomy and drainage of osteomyelitis of tibia and humerus	1	1	..	..	..
" " " of osteomyelitis of tibia	1	1	..	..	..
" " " for persistent sinus following osteomyelitis of tibia	1	1	..	..	..
Bier operation for osteomyelitis of tibia	1	1	..	..	..
Sequestrectomy for necrosis of tibia	...	...	..	..	..
Schede operation for osteomyelitis of tibia	1	1	..	..	..
Osteotomy and drainage of bone abscess of tibia	1	1	..	..	..
Reduction of fracture of tibia	2	2	..	..	..
Excision of bilateral prepatellar bursitis	1	1	..	..	..
Aspiration and irrigation of acute synovitis of knee	1	1	..	..	..
Primary resection of knee joint for pyarthrosis	1	1	..	..	..
Incision and drainage of knee joint for hemarthrosis	1	1	..	..	..
" " " " infected wound of knee	1	1	..	..	..
" " " " abscess of knee joint	1	1	..	..	..
Resection of knee joint for tuberculosis	4	4	..	..	..
Skin graft for contracture of knee following burns	1	1	..	..	..
Resection of knee for vicious ankylosis	1	1	..	..	..

Operations on Lower Extremity and Pelvis—*(Continued)*	Total.	Cured.	Improved.	Unimproved.	Died.
Excision of ganglion of knee	1	1	..	..	..
Amputation at thigh for sarcoma of patella	1	...	..	1	..
Reduction of fracture of neck of femur	2	2	..	..	..
Suture of fragments for mal-union of radius and ulna	1	1	..	..	..
Wiring of fragments for ununited fracture of femur	1	1	..	..	..
Osteotomy and drainage for tuberculous osteomyelitis of femur	1	1	..	..	..
Amputation of thigh for pyarthrosis of knee	1	...	..	..	1
Osteotomy and drainage of bone abscess of femur	1	1	..	..	..
Resection for enchondroma of femur	1	1	..	..	..
Osteotomy for bone abscess of femur	1	1	..	..	..
" " osteomyelitis of femur	1	1	..	..	..
Resection of knee for osteomyelitis	1	1	..	..	..
Incision and drainage of osteomyelitis of femur	1	...	1	..	..
" " " " blood cyst of femur	1	1	..	..	..
" " " " pyarthrosis of ankle " " " " abscess of back " " " " abscess of hand " " " " abscess of leg " " curettage of mastoid for acute mastoiditis	1	*1	..	..	..
Excision of varicose veins	1	1	..	..	..
Removal of needle from thigh	1	1	..	..	..
Incision and drainage of infected fracture of femur	1	1	..	..	..
" " " " abscess of thigh	1	1	..	..	..
Excision of lipoma of thigh	1	1	..	..	..
Plastic for contractures of thigh after burns	1	1	..	..	..
Excision of bursa around hip joint for bursitis	1	1	..	..	..
Incision and drainage of femoral adenitis	4	4	..	..	..
" " " " inguinal adenitis	1	1	..	..	..
" " " " abscess of groin	1	1	..	..	..
Excision of dermoid cyst of sacral region	2	2	..	..	..
Incision and drainage of infected dermoid cyst of sacral region	1	1	..	..	..
Removal of part of sacrum for necrosis	1	1	..	..	..
Incision and drainage of sacral abscess	1	1	..	..	..
Sequestrectomy and drainage for tuberculous osteomyelitis of symphysis pubis	1	1	..	..	..
Incision and drainage for tuberculosis of ileo-sacral joint	1	...	1	..	..
Osteotomy and drainage for osteomyelitis of ileum	1	1	..	..	..
Incision and drainage of abscess following fracture of pubic bone	1	...	..	..	1
Osteotomy and drainage for acute osteomyelitis of lumbar vertebræ	1	1	..	..	..
Multiple incision of carbuncle of back	1	1	..	..	..
Incision and drainage of psoas abscess	1	...	1	..	..
Injection of iodoform and ether into iliac abscess	1	...	..	..	1
Injection of iodoform and glycerine into abscess of back	2	1	1	..	..
Excision of melanatic sarcoma of back	1	1	..	..	..

* Patient subsequently developed mastoid disease on the other side, meningitis followed, and he died.

MALIGNANT HYPERNEPHROMA OF THE KIDNEY—ITS CLINICAL COURSE, DIAGNOSIS AND TREATMENT.

By A. A. Berg, M.D.,

ADJUNCT SURGEON TO MOUNT SINAI HOSPITAL, N. Y.

From 1898 to January, 1907, there have been in all the services of Mt. Sinai Hospital 21 cases of hypernephroma of the kidney. During this same period there have been altogether, including the hypernephromata, 25 cases of renal neoplasm, i.e., 87.5% of the cases of renal tumor belonged to the class of hypernephroma. This corresponds roughly with the frequency of occurrence of this malady in the Allgemeine Krankenhaus in Vienna; at that place in a perod of ten years, Albrecht, from the service of Hochenegg, reports 28 of the 32 cases of renal tumor as being hypernephroma. Fourteen of our patients were males, seven were females, and all of them were adults, between the second and fifth decennials of life.

The term "hypernephroma" has been applied by Birch-Hirschfeld to tumors arising from adrenal tissue located elsewhere than in the suprarenal gland. Such islands of adrenal tissue, called "adrenal rests," occur most frequently in the kidney immediately beneath the capsule; they have also been found under the capsule of the liver along the course of the spermatic artery, in the spermatic cord, and on the peritoneum near the ovary. Tumors arising from such "adrenal rests" (hypernephroma) may be clinically of a benign or malignant character. The latter form nodular tumors of yellowish-brown color, firm in the center and softer (sometimes of brain-like consistency) in the periphery. Smaller and larger cysts filled with clear, or atheroma material, or bloody fluid sometimes occupy the peripheral portions of the tumor, and in the later stages numerous hemorrhagic areas and breaking-down portions are visible. The separate nodules in the kidney are sometimes encapsulated; again they

infiltrate the kidney parenchyma and invade its pelvis, protruding into the latter like pedunculated polypi, or choking it up completely. Frequently the tumor masses grow into the renal veins and vena cava.

Only the malignant variety of hypernephroma will be considered in this paper, the intent of the writer being to discuss its clinical course, diagnosis and treatment. In this he will be guided largely by the observations made in our own cases. To Drs. Gerster, Lilienthal, Brill and Krug are owing the thanks of the writer for the privilege of using the material of their respective services.

CLINICAL COURSE.

In the largest percentage of the patients with this malady, in our series, six of the 21, the initial manifestation was a dull ache or sharp pain in the loin or side of the abdomen. The pain sometimes radiated to the lower extremities; it was not of a colicky character. One of our patients suffered for five months from such pain before any other symptom appeared; another for two months; another for four months; another for six months; another for ten months; and still another for two years. The pain is variously explained by different writers; some believe it to be due to pressure by the growing tumor upon the lumbar plexus of nerves; others to an increased kidney tension, which is occasioned by hemorrhages into the tumor.

As indicated above, this pain exists in this class of the patients for a variable time before any other symptom or physical sign of the malady is present. Then there occurs an attack of hematuria, or a tumor becomes palpable in the loin. Albrecht and Israel both consider that a long duration of lumbar pain prior to the appearance of a tumor or the occurrence of hematuria, is of diagnostic importance in the differentiation of hypernephroma from other varieties of renal neoplasm. In some of these patients there will be microscopic blood in the urine for some time prior to the occurrence of macroscopic hematuria; the importance therefore of careful urinary analysis in all cases of lumbar pain of which the causation is in doubt, is very evident.

After a tumor has developed or an attack of hematuria has occurred these cases go along in the usual way, with continued pain,

repeated attacks of hematuria, increasing size of the tumor and more or less rapid physical deterioration.

There is another class of these patients in whom the earliest symptom of the malady is an attack of macroscopic hematuria, usually attended with colicky pain in the loin radiating to the bladder, frequent urination and tenesmus.

The amount of blood in the urine varies; sometimes it is very profuse, again it is only slight; sometimes there are long ureteral casts of blood in the urine.

The hematuria may recur very shortly or only after a considerable time. In addition to those patients in which the hematuria is the first sign of the disease, a number of others have, at some time or other in the course of the malady, macro- or microscopic blood in their urine. Thus Albrecht reports that 39.3% of his cases had blood in the urine at some time of the disease, whereas in only 21.4% was it the first symptom. In three of our cases, i. e., 13.6%, the hematuria was the initial symptom, while in nine, or 40%, there was blood in the urine at some time in the course of the disease.

In comparison with other malignant tumors of the kidney, the hypernephromata are less likely to be attended by hematuria. Thus Israel computed that 92% of the cases of malignant neoplasms of the kidney are attended with macro- or microscopic hematuria, and that in 70% this is the initial symptom of the disease. The absence of hematuria is therefore another point of diagnostic importance in the differentiation of hypernephroma from other varieties of malignant renal tumors; and especially significant of hypernephroma is a long interval between the attacks of hematuria, or a long period between the initial hematuria and the time when the patient seeks operative relief.

In some of the cases the bleeding is occasioned by ulcerating polypous tumor masses in the kidney pelvis, in others by the rupture of the kidney capillaries from over distention owing to compression of the renal vein, by the growing tumor or metastases therefrom. In some cases, however, there is profuse bleeding, even though neither one of these conditions is present.

It is strange that with such vascular tumors as hypernephroma, bleeding is not more common, but a study of the specimens of kidneys

affected with this neoplasm will explain its absence in many instances. In quite a number we find the entire secreting structure destroyed, and the pelvis completely filled with tumor masses. As there is no urine secreted by such organs there is manifestly nothing to contaminate the healthy secretion of the remaining normal kidney, and as the pelvis is choked with tumor masses no blood can make its way through it into the ureter and bladder. In two of our cases such conditions existed. In neither case was there any blood in the urine.

In some of the patients whose attention is first drawn to their disease by an attack of hematuria, there will be found on examination a tumor in the loin; this was the case in two of our patients.

In others again no physical abnormalities are to be detected by the most careful examination, nor does the examination of the urine throw any light upon the cause of the hematuria. At the time of the bleeding the cystoscope will enable us to determine from which kidney the blood is derived. There may be several attacks of hematuria before any other physical symptoms or physical signs develop to throw added light on the nature of the kidney malady; but finally lumbar pain, the appearance of a tumor in the loin, or cachexia complete the clinical picture of renal neoplasm. As already stated, a long interval between the attacks of hematuria points to the probable diagnosis of hypernephroma.

There is a third class of patients who notice nothing abnormal about themselves except a progressive loss of weight, weakness, and a feeling that slight exertion causes them to be much fatigued. This was the case in three of our patients. One of them steadily lost flesh for five months, and another for three months; then they both had an attack of hematuria which caused them to seek medical advice. The third patient lost 50 pounds in six months and sought hospital care for this complaint. In all three of these cases there was found on examination a hard nodular tumor in the loin. It is the writer's opinion, that loss of weight, weakness, and cachexia only occur with hypernephroma when the tumor is a rapidly growing one. In those of our patients in whom the neoplasm was of slow growth there was no deterioration of the general health, and no marked loss of weight, even though the tumor had in some instances attained

considerable proportions. Patients of this class may be conscious of a lump in their loin for some time, years perhaps; they may notice that the swelling slowly increases in size, but as they suffer no inconvenience therefrom they do not seek medical aid. Then at some one time they commence to lose flesh and strength, later on perhaps have an attack of hematuria, either of which causes them to consult their physician. The absence of cachexia and loss of weight with a renal tumor, and especially if it be of considerable size, would speak in favor of the neoplasm being a hypernephroma.

The presence of a steadily growing tumor in the abdomen is the first indication of the disease in another class of these patients. This was the case in five of the patients. Sometimes the tumor is painful and tender; again neither of these characteristics is present. In this group of patients there is not apt to be either macro- or microscopic hematuria, for as a rule the growing neoplasm destroys the entire kidney cortex and chokes the kidney pelvis.

In addition to those patients in whom the gradual development of a tumor in the abdomen forms the first indication of the disease, there are others in whom a tumor appears at some time in the further course of the malady. Thus of our 21 cases, 13 or 51% had a palpable tumor in the loin at the time of their admission to the hospital. The tumor varied in shape, size, consistency and fixidity. In some instances it was small, hard and nodular. The larger tumors were of unequal consistency, hard in places, softer and elastic in others, but never truly fluctuant. The nodular character seemed to belong to all the tumors. The smaller growths were usually freely movable; the larger ones were more or less fixed to the surrounding structures. In some instances a normal lower pole of the kidney could be palpated below the tumor. The tumor bears the same relation to the ascending and descending colon as does a tumor of the kidney. As long as the tumor grows gradually the patients do not lose much flesh or strength, but when it increases rapidly in size, or when tumor masses rupture into the renal and inferior caval veins then a rapid deterioration of the physical condition and cachexia develop.

In a fifth class of patients the first evidence of the disease is manifested by one or more metastatic tumors (two of our cases). These are most frequently situated in the long bones, in the bones of

the skull, sternum or pelvis, or in the lung, but they may be located in any organ of the body, (in one case recently reported the metastatic tumor was in the iris, *Journal of Amer. Med. Assoc'n,* Feb. 9, 1907). These metastatic tumors are usually painful and grow rather slowly. When located in the bones they do not excite any periostitis, but gradually erode them, so as to occasion spontaneous fractures.

In some of the patients of this class though the metastatic tumor is the first to attract the patient's attention, yet physical examination may reveal a nodular tumor in the loin, or careful urinary examination may show the presence therein of red blood-cells, either of which findings will throw considerable light on the probable nature of the secondary growth. Hence the importance of making a careful physical examination and analysis of the urine in all cases of neoplasms, especially those of the bones. In other patients of this class, even the most painstaking physical examination and urinary analysis will fail to reveal any abnormality; and in such instances it is impossible to determine the nature of the metastatic tumor until we subject it to histological examination. This was the case in two patients.

Metastatic tumors, secondary to large, hard nodular tumors in the loin, were present in several of our cases; they were chiefly located in the lungs; in one case in the mesentery of the small intestine; in another in the lungs and liver; and in another, secondary growths were present in both ovaries. Whether in this last case the tumors are to be looked upon as metastatic or as primary hypernephromatous tumors from misplaced adrenal rests in the ovary, is an open question. We have noticed that in several patients who succumbed a few weeks after operations, there developed symptoms of general systemic intoxication, and in some of these there were secondary neoplasms in the lungs, etc. It seemed to us that in these cases the manipulations of the tumor necessary to its removal caused a dissemination of tumor tissue into the blood-stream and its consequent metastatic lodgment in the internal organs.

Hypernephromata are especially likely to give rise to metastases through the blood-stream, though several instances of secondary growths through the medium of the lymphatics are recorded in the literature. The reason of the greater frequency of secondary infec-

tion by the blood is owing to the tendency of these tumors to grow into the renal vein and inferior vena cava. In a patient of Dr. Brill the tumor filled the renal vein and inferior cava, and in another it filled all the veins of the mesentery of the small intestines.

There are finally some patients who suffer with hypernephroma, in whom the initial symptoms and entire clinical course are very irregular.

The writer has endeavored thus far to indicate the initial manifestations of patients suffering with hypernephroma. In their subsequent course these individuals may progress slowly or rapidly. Some patients may go along for years with an occasional attack of hematuria, or with lumbar pain or with a nodular tumor in the loin, or with several of these symptoms. They do not seem to be much affected by their malady, they remain in fairly good health, and are able to attend to their duties; in other instances they rapidly emaciate and become cachectic; in all such cases the writer has found that the tumor is a rapidly growing one. Some patients do not deteriorate much even when a metastatic tumor appears. It is to be noted that the metastases of hypernephromata are very often single, numerous cases being on record of this kind. This has an important bearing on our treatment of such cases; for whereas with other varieties of malignant neoplasms we would not be apt to remove either the primary or metastatic tumor, because the metastatic foci of disease are usually multiple, yet in this variety of growth we would be justified in extirpating both the primary tumor and the secondary deposit because we know that the latter is frequently single.

The slow course of many cases of hypernephroma also has an important bearing in our consideration of the operative removal of the neoplasm. This will be referred to later on.

In the final stages of the disease the patients are cachectic and emaciated, have a large nodular tumor in the loin, sometimes suffer with recurrent attacks of hematuria or with intense pain, and may present metastases in the lungs, bones or other viscera.

DIAGNOSIS.

A number of points in the diagnosis and differential diagnosis of malignant hypernephroma have already been mentioned in the course

of the paper. In this more detailed discussion of the subject it will be best to consider the disease as it appears in its initial and later stages. First, as to those cases in which pain in the loin is the first symptom. Some of these patients will endure the pain for quite a time before they seek medical advice, and when they finally do consult the physician there may be a palpable nodular tumor in the loin. In such cases a long duration of the pain suggests that the tumor is a hypernephroma. Other patients endure the pain until an attack of hematuria occurs; in such cases a long interval of pain prior to the occurrence of hematuria suggests the diagnosis of hypernephroma. Altogether in hypernephroma, lumbar pain is more apt to be a striking symptom than it is with the other varieties of renal neoplasm.

Should the patients of this class seek relief in the early stages of their suffering, i.e., prior to the appearance of a tumor or to the occurrence of a hematuria, then the diagnosis cannot be arrived at. In such cases we will have to consider all the possible causes of pain in the loin, and by careful and thorough examination and observation try to exclude first one and then the other. In these patients it is especially important to repeatedly examine the urine for microscopic blood; if red blood cells are present, the finding will be especially significant if it is proved by ureteral catheterization that they come from the kidney corresponding to the side of the pain, and if by X-ray examination we can exclude the presence of renal stone.

It has been pointed out by Israel that where, because of pain in the loin and hematuria, whether macro- or microscopic, we would suspect the presence of a neoplasm of the kidney, the occurrence of moderate, irregular temperature elevations would suggest the tumor being of adrenal type. Thus he has found that in 57% of his cases of adrenal tumors there were these irregular temperature elevations, whereas in only one to two per cent. of the cases of renal tumor did such fever occur. In 10 of our patients, the temperature prior to operation ranged between 99-100°, and in only two did it reach 102°. We have not found in these early stages of the disease that the patients lose flesh or strength sufficiently to attract their attention.

The presence of a palpable tumor in the loin makes the diagnosis in these cases somewhat easier. We have first of all to recognize

the tumor as a retroperitoneal one, thereby excluding the gall-bladder, liver and stomach, and secondly we must exclude other varieties of retroperitoneal lumbar tumors, e.g., lymphosarcoma and other types of kidney tumors, e.g., tuberculosis and pyonephrosis. This can be done by careful consideration of the clinical history, by distention of the stomach and colon, by gastric analysis, by cystoscopic examination, and analysis of the combined and separate urines.

In this way we can narrow down the diagnosis to some form of renal neoplasm, and in our conclusion as to what type of tumor is present we are guided (1) by the comparative frequency of occurrence of the different varieties of kidney tumor; (2) by the duration of the symptoms; (3) by the physical characteristics of the tumor and its relation to the kidney; (4) by the occurrence of irregular temperature elevations; (5) by the less frequency of hematuria with hypernephroma.

It has already been pointed out that hypernephromata are much more frequent than are renal sarcomata or carcinomata; in our series, and in those of Albrecht 87% of all the cases of renal neoplasm belonged to the type of hypernephroma.

Albrecht has also drawn attention to the fact, and this is confirmed by our own observation, that a long interval between the initial symptoms, pain, hematuria, etc., and the time the patient applies for treatment points to hypernephroma as against sarcoma or carcinoma. Again, as has been pointed out above, hypernephromata are attended with but little cachexia, whereas in sarcoma and carcinoma this is an early manifestation.

The relation of the tumor to the kidney and its shape will sometimes help us materially in the differentiation. Thus it is a well-observed fact that sarcoma and carcinoma of the kidney cause an uniform enlargement of this organ and therefore maintain an ovoidal or reniform shape, whereas hypernephroma only causes enlargement of that part of the kidney in which the adrenal rests lie. The latter tumors therefore have an irregular broad shape, and if they involve the upper pole or lateral aspect of the kidney, it is possible to palpate at their lower border the normal lower pole of the organ.

The recognition of the disease in those patients whose initial symptom is hematuria is often very difficult. Should there be a

characteristic palpable tumor in the loin, much aid in making the diagnosis will be afforded. In the absence of such a tumor we must first determine by the cystoscope and ureteral catheter from which kidney the blood is derived; then by X-ray examination, physical examination and urinary analysis, exclude calculous disease, tuberculosis and chronic inflammation, and finally resort to diagnostic nephrotomy when any doubt exists as to the nature of the kidney malady.

As was stated before, it is our opinion that in all those patients whose primary and chief complaints are loss of weight and strength, increasing weakness and lassitude, there is a rapidly growing and palpable tumor in the loin or metastatic tumors in other organs. The tumor may not have attracted the patient's attention, and he may not seek medical aid until hematuria occurs, or until an increase in the size of the abdomen, or a continuous pain in the loin, or the accidental palpation of a lump in the abdomen impels him to apply to the physician. In these patients the characteristics of the tumor will materially aid in reaching the correct diagnosis.

The patients who come to us complaining only of a tumor in the loin are usually the easiest to recognize. The relations and characteristics of the tumor, the absence of hematuria and the greater frequency of occurrence of hypernephroma readily enable us to decide between other renal neoplasms and hypernephroma, and by X-ray examination, cystoscopy, and ureteral catheterization, with careful analysis and examination of the separated urines, we can exclude stone disease and tuberculosis.

The most interesting cases for diagnosis are those in which the initial manifestation of the disease is a metastatic tumor in the bone or other viscera. So frequently do these metastatic tumors occur in connection with hypernephroma, that it should be our invariable practise, when we have to do with a growth of doubtful character in a bone or internal organ, to carefully palpate the loin for the presence of a tumor and examine the urine for red blood-cells. If we will only remember that tumors of the bones, lungs, or other of the internal organs may be metastatic to hypernephroma of the kidney and always follow the practise indicated above, many cases will be diagnosed before they reach the post-mortem room and patho-

logical laboratory. It should be noted, however, that there occur cases of hypernephroma with metastatic deposits in which the most painstaking examination will fail to show any abnormality in the urine or in the kidney regions.

In our series of patients two were of this kind; but in a third, who came with a painful tumor of the thorax at the angle of the scapula and in whom long and careful palpation of the loin failed to reveal a tumor, the diagnosis was suggested by the presence of red blood-cells in the urine.

Albrecht thinks that a hypernephroma of the bone can be differentiated from tuberculous osteomyelitis by the absence of periosteal thickening and rarefication, and from medullary sarcoma of bone by the fact that the latter tumors thin out, but do not destroy the cortical tissue until the final stages, whereas hypernephromata destroy all the component layers, viz., the periosteum, cortex and medulla. Such differences are of course only to be appreciated by X-ray examination.

The diagnosis in such cases of this disease as run an atypical course, as the two cases of our series already detailed, cannot be made except by histological and post-mortem examination.

In summing up the remarks just made as to diagnosis the writer would insist on the importance of the characteristics of the renal tumor, on the slower course of hypernephromata, on their much greater frequency of occurrence as compared with other varieties of renal tumors, on their less frequent association with hematuria than is the case with sarcoma or carcinoma of the kidney, and on their greater likelihood to be attended by continued pain in the loin or abdomen. Furthermore the writer would again insist on the importance of a careful palpation of the kidney regions and urinary analysis in all cases of tumor of the bones, lungs or other internal organs.

TREATMENT.

The radical treatment of hypernephroma, like the radical treatment of other malignant tumors, should be a complete removal of the neoplasm. The indications for operation cannot, however, in the writer's opinion be put down as for sarcoma and carcinoma. In these latter varieties of neoplasm we advise radical removal as soon as the

diagnosis is made, provided (1) that the patient's general condition warrants surgical interference; (2) that the local relations and extent of the tumor give us a fair hope of removing the entire disease; and (3) that there are no distant metastatic foci of the disease.

As has been stated in the course of this paper, hypernephromata often pursue a very slow course, and during a large part of the time the patients' general health is not much influenced, nor their well-being much interfered with. The affected individuals may from time to time, suffer from an attack of hematuria, they may be conscious of a tumor in the abdomen, they may have lumbar pain, but all in all they pursue their daily business and enjoy life. If, therefore, the patient's age is well advanced and his internal organs are diseased, so that the immediate operative risks are increased, and if in our observation of the patient we determine that the course of the neoplasm is a slow one, it is better in the writer's opinion not to interfere surgically, but to keep the patient under observation. Such a patient the writer has under his care at present. She has a bad heart, and emphysematous lungs, she is beyond 65 years of age, and she has had the hypernephroma to our knowledge for at least three years; yet she gets along very well, and is able to attend to her household duties, whereas a surgical attack upon the neoplasm would be attended by very great risks.

From the experience in our cases very little is to be gained by removal of large adherent tumors. The immediate operative mortality in such cases is very high; in our series four died within 24 hours after operation from shock. Should the patient survive the operation, local or distant recurrence is almost sure to take place within a short time, often before the wound in the loin is healed; thus three of our patients manifested such recurrence before they could be discharged from the hospital and succumbed there to the disease, and one other such case had a recurrence within several months after leaving our care. It is advisable, therefore, to decline radical operation in all cases where the tumor is very large and fairly adherent; and in those cases in which there is a reasonable doubt as to the extent of the adhesions of the tumor it is best to explore either by the abdominal or lumbar route before proceeding to radical operation.

Rarely, if ever, do we advise radical removal of a primary sarcoma-

tous or carcinomatous tumor after distant metastases have formed, and yet in the cases of hypernephroma such practice may be advisable. In sarcoma and carcinoma we decline operation in the presence of distant metastases, because we know that as a rule these are rarely single; in hypernephroma, however, such distant foci of disease are not infrequently solitary ones, and if they together with the primary tumor are completely removed permanent cure is possible. Thus in one of our cases there was a single metastasis in the ischium, confirmed by autopsy, which could have been removed if the diagnosis had been made; Albrecht also reports one case of a single metastatic tumor in the clavicle that could have been radically removed, together with the primary growth, had the patient consented to operation at an early date.

The route we are to select for removal of the kidney tumor is a most important consideration. In coming to a conclusion on this point we should bear in mind the following facts: first, that it is not infrequent for hypernephromata to grow into the renal vein and inferior cava, and that in such cases even slight manipulations of the tumor during its operative removal may dislodge fragments thereof into the general circulation and thus give rise to metastases in distant organs, especially in the lungs. This happened in three of our cases; shortly after operation these patients developed the physical signs of metastatic foci in the lungs, and subsequent autopsy showed the presence of such tumors; in one of these patients there were also cerebral symptoms pointing to a metastatic tumor of the brain. Secondly, in two of these patients there developed a few weeks after operation a general glandular enlargement, and in one of them a hemorrhagic eruption on the skin, which together with temperature elevations suggested a general toxemia. It seemed to us that this toxemia, following so closely upon the operation, had some connection with the latter, and as there were no wound disturbances to account therefor, beyond local recurrence, we attributed it to a dissemination of the products of breaking-down tumor tissue, induced by our manipulation at the time of operation. In view of these facts it seems to the writer that though the lumbar route affords readier access to the tumor and more efficient drainage of the bed of the kidney than does the abdominal, yet the latter is to be preferred,

because in this way we can tie off the renal vein before manipulating the tumor, and thereby prevent dislodgment into the circulation of tumor tissue and products of tumor degeneration. The tying off of the renal vein should in the opinion of the writer be the first step in the operation for the removal of malignant hypernephroma of the kidney. After tying the renal vessels through the abdominal incision we can either proceed to the extirpation of the tumor through the same incision and counter-drain the bed of the tumor into the loin, or we can close the abdominal wound and proceed through a second incision in the lumbar region.

A few words as to the immediate and remote results of operation for hypernephroma. Of our 21 cases 20 were operated upon; in 15 the kidney tumor was removed; of these four died within 24 hours of the operation; three died of local and distant recurrence several weeks after operation; one died several months after operation with local recurrence; one had a recurrence in the skull which was partly removed and she has probably died since; four cannot be traced; one has remained well for two years; and one is still in the hospital.

In one case an exploratory incision was made to see whether the tumor could be extirpated; he died several weeks later from general exhaustion.

In one tumor of the ischium the common iliac artery was tied, because of the diagnosis of gluteal aneurism; he died seven days later. In one a section of a tumor of the femur was removed; he died. In one a colostomy had been done for intestinal obstruction caused by adhesion of the tumor to the splenic flexure of the colon; this patient died subsequently from peritonitis due to perforation of the Murphy button in the attempt to close the artificial anus by ileo-sigmoidostomy. And finally, in the one patient part of the tumor was excised to relieve pressure upon the dorsal nerve roots; this patient, though still alive several weeks after operation, is in a precarious condition and will succumb very soon.

Of all of our cases, then, only one has positively remained well for two years after operation, four cannot be traced, and one is still in the hospital. This is not a glowing or encouraging picture for the cure of this malady.

The only patient not operated upon died in the hospital several weeks after his admission. One other case is alive, the patient, who likewise was not operated upon, and seems to be getting along very well in spite of the hypernephroma.

DISEASES TREATED IN THE SECOND SURGICAL DIVISION,

From December 1, 1904, to December 1, 1905.

HOWARD LILIENTHAL, M.D.,
ATTENDING SURGEON.

CHARLES A. ELSBERG, M.D., JOSEPH WIENER, JR., M.D.,
ADJUNCT ATTENDING SURGEONS.

TOTAL 965.

	Total.	No operation.	Died.
Cranium—17.			
Brain, tumor, cerebellum	1	..	..
" chronic hydrocephalus	1	..	1
" epilepsy, traumatic	1	..	..
" concussion	1	1	..
" cerebral hemorrhage	1	1	1
Skull, depressed fracture	1	..	..
" frontal bone, necrosis	1	..	..
" premature ossification of	1	1	..
" acute mastoiditis	1	..	..
" sinusitis, frontal	1	1	..
" empyema of frontal, ethmoid, sphenoid and maxillary sinuses	1	..	..
Scalp, wounds, lacerated	6	3	..
Face and Mouth—39.			
Lip—4			
Hare lip	3	1	..
" " and cleft palate	1	..	1
Nose—3			
Deviation of septum	1	..	..
Contusion	1	1	..
Nasal bones, fracture, compound	1	1	..
Face—11.			
Urticaria	1	1	
Noma	1	..	..
Cheek, lacerated wounds	1	..	..
" epithelioma	1	..	..
Chin, sinus	1	..	..
Forehead, angeioma	1	..	..
Trifacial neuralgia	2	..	..
Malar bone, fracture	1	..	..
Parotid gland, sarcoma	1	..	..
" " acute gangrenous inflammation	1	..	..

	Total.	No operation.	Died.
Superior Maxilla—5			
Osteoma	1	..	..
Cyst	1	..	..
Cleft palate	2	..	..
Empyema, antrum of Highmore	1	1	..
Inferior Maxilla—10.			
Osteomyelitis	5	2	..
Dentigerous cyst, infected	1	..	..
Unerupted tooth	1	..	..
Osteomyelitis, acute leukemia	1	..	1
Actinomycosis	1	..	..
Metastatic carcinoma	1	..	1
Oral Cavity—6.			
Epulis	2	..	..
Sublingual abscess	1	..	1
Peritonsillar "	2	1	..
Epithelioma of mouth and cheek	1	1	..
Pharynx and Larynx—6.			
Tonsil, sarcoma, (and of femur)	1	1	..
Epiglottis, carcinoma	1	1	..
Pharynx, sarcoma	1	1	..
Retropharyngeal abscess	1	..	..
" " pneumonia	1	..	1
Adenoids	1	1	..
Neck—34.			
Abscess	1	..	..
Cellulitis, edema of larynx	1	..	..
Abscess, ulceration into external carotid artery	1	..	1
" submaxillary	4	1	..
Phlegmon	1	..	..
Carbuncle	1	..	..
Phlegmon ligneux	2	..	..
Adenitis, tuberculous	5	1	..
" carcinomatous	2	..	1
" suppurative	1	..	..
" submaxillary	4	1	..
Branchiogenetic cyst	1	..	..
Thyreoid cyst	2	..	..
Goitre, parenchymatous	1	..	..
" cystic	2	..	1
Endothelioma of glands	1	..	..

Neck—*(Continued).*	Total.	No operation.	Died.
Carcinoma	1	..	1
" recurrent	1	..	1
Burns	1	..	..
Upper Extremity—45.			
Shoulder—8.			
Abscess	1	..	..
" periarticular	1	..	..
Lipoma	1	..	..
Suppurative arthritis	1	..	..
Subglenoid dislocation of humerus	1	1	..
Fracture of clavicle	2	1	..
Aneurism of subclavian artery	1	..	..
Axilla—9.			
Abscess	3	..	..
Adenitis	3	..	..
" suppurative	1	..	..
Cysto-sarcoma	1	..	..
Cicatricial contraction	1	..	..
Arm—5.			
Phlegmon	1	..	..
Sarcoma	1	..	..
Lipoma	1	..	..
Fracture of humerus, ununited, surgical neck	1	..	..
Epiphysial separation, humerus, head	1	..	..
Forearm and Elbow—13.			
Burns	1	1	..
Abscess, tuberculous	1	..	..
Ulna, acute, osteomyelitis	1	..	..
" and radius, ununited fracture	1	..	..
" " " malunited fracture	1	1	..
" pathological fracture, syringomyelia	1	..	..
Elbow, abscess, periarticular	2	..	..
" infected wound	1	..	..
" olecranon bursitis, suppurating	1	..	..
" anchylosis, after fracture	1	1	..
" "	1	1	..
" tuberculosis	1	..	..
Hand and Wrist—10.			
Cellulitis	1	..	..

Hand and Wrist—*(Continued).*	Total.	No operation.	Died.
Infected wounds	1	..	..
Phlegmon, with osteomyelitis	1	..	..
Burns, and of face	1	1	..
Gangrene, diabetic	1	..	..
" of finger, carbolic acid	1	..	..
Ganglion, of wrist	1	..	..
Necrosis of carpal bones	1	..	..
Osteomyelitis, of carpal bones, arthritis wrist	1	..	..
Synovitis, tuberculous, of wrist	1	..	..
Thorax—21.			
Abscess of chest wall	2	..	..
Burns of chest	2	1	..
Sinus of chest wall	4	..	..
Lipoma of chest wall	2	..	.
Fracture of sternum	1	..	..
" " rib	1	1	..
Necrosis of rib	1	1	..
Foreign body in bronchus	1	..	..
" " " pleura after empyema	1	..	..
Empyema	6	..	..
Breast—25.			
Acute mastitis	8	1	..
Chronic mastitis	4	1	..
Inflammatory tumor	1	..	..
Fibro-cyst	1	..	..
Adenoma	1	..	..
Keloid	1	..	..
Sarcoma	1	..	..
Carcinoma	8	2	..
Spine—7.			
Trauma to spinal column	1	1	..
" " cervical region	1	1	..
Cervical rib	1	..	..
Osteomyelitis of cervical vertebræ	1	..	..
Chronic osteomyelitis of sacrum	1	..	..
Coccygodynia	2	..	..
Abdominal Wall—8.			
Abscess of abdominal wall	1	..	1
Extraperitoneal abscess	1	..	..
Sinus of abdominal wall	2	2	..
Hemorrhagic cyst of abdominal wall	1	..	..

Abdominal Wall—*(Continued).*	Total.	No operation.	Died.
Stab-wound	1	1	..
Retroperitoneal inflammatory tumor	1	..	..
Contusion of lumbar region	1	1	..
General Abdominal Cavity—22.			
Tuberculous peritonitis	3	1	1
" " with intestinal fistula	2	2	1
Pneumococcus peritonitis	2	..	2
General gonococcus peritonitis	1	..	..
Peritonitis—cholecystitis	1	1	1
Chronic peritonitis	2	..	1
Subphrenic abscess secondary to liver abscess	2	..	1
Intra-abdominal abscess	4	..	..
Retrocolic abscess	1	..	1
Abdominal tumor	1	1	..
General abdominal carcinomatosis	1	..	1
Chronic intestinal obstruction due to bands	1	..	..
Perforating gun-shot wound of chest and abdomen	1	..	..
Esophagus and Stomach—20.			
Foreign body in esophagus	1	..	..
Carcinoma of esophagus	4	1	3
Cardiospasm	1	1	..
Gastric ulcer	1	..	..
Carcinoma of stomach	5	1	1
Gastric dilatation, gastroptosis	1	..	1
Stenosis of pylorus	5	..	1
" " " periduodenal abscess	1	..	1
Carcinoma of pylorus	1	..	1
Liver—5.			
Carcinoma	1	..	1
Sarcoma	1	..	1
Abscess	2	..	1
Cirrhosis	1	..	..
Pancreas—1.			
Acute pancreatitis, cholelithiasis	1	..	..
Gall-Bladder and Ducts—45.			
Cholecystitis, cholelithiasis	7	..	2
Chronic cholecystitis, choletithiasis	12	..	1

Gall-Bladder and Ducts.—(*Continued*).	Total.	No operation.	Died.
Acute cholecystitis	1	..	..
" " cholelithiasis	3	..	1
Cholelithiasis	1	..	1
Chronic cholecystitis	3	..	..
" " cholangeitis	1	..	..
Cholecystitis and pericholecystitis	1	..	..
Cholecystitis, cholelithiasis, intestinal obstruction and general peritonitis	2	..	1
Suppurative cholesystitis with stone	1	..	..
Gangrenous cholecystitis with stone	1	..	..
" " cholelithiasis	2	..	1
" " acute pancreatitis	1	..	1
Stricture of common bile duct after cholelithiasis	1	..	..
Chronic cholecystitis and stone with biliary fistula	1	..	..
Stone in common duct	2	..	..
Persistent biliary sinus	1	..	..
Persistent biliary fistula after cholecystostomy	2	..	1
Postoperative adhesions after cholecystectomy	1	..	..
Obstructive jaundice	1	1	1
Intestines—21.			
Tuberculous abscess of intestine	1	..	1
Intussusception	1	..	1
Intestinal obstruction	3	..	2
Carcinoma of sigmoid flexure	2	..	1
Intestinal obstruction due to bands	1	..	..
Volvulus	1	..	..
Strangulated Meckel's diverticulum; gangrene of gut	1	..	1
Fecal impaction	2	2	..
Postoperative fecal fistula	1	1	..
Constipation	3	3	..
Tuberculosis of cecum and colon	2	..	1
Typhoid perforation of cecum	1	1	1
Fecal fistula following appendicitis	2	1	..
Appendicitis—196.			
Acute catarrhal	18	1	..
Acute gangrenous	25	..	..
" " with abscess	4	..	..
" " perforative, with abscess	19	..	2
" " " " general purulent peritonitis	4	..	3
" " " " diffuse sero-purulent peritonitis	5	..	5
" " with sero-purulent peritonitis	17	..	1
" " " " " with mesenteric thrombosis	1	..	..
" " " mesenteric thrombosis	1	..	..
" " " subphrenic abscess	2	..	1

	Total.	No operation.	Died.
Appendicitis—*(Continued).*			
Acute gangrenous perforative	2	..	1
" with abscess	12	..	..
" " general peritonitis	2	1	2
Abscess	2	..	..
Empyema of appendix	5	..	..
Acute, with hemorrhagic peritonitis	1	..	..
" hemorrhagic	1	..	..
Subacute, with abscess	2	..	..
"	13	1	..
Chronic	48	4	..
" —mucus colitis	1	..	..
Intra-abdominal abscess after appendicectomy	2	..	..
Appendicitis sinus	3	2	..
Postoperative adhesions after appendicitis	4	..	..
Adeno-carcinoma of appendix	1	..	..
Primary lympho-sarcoma of appendix with metastases	1	..	1
Hernia—111.			
Inguinal, indirect	37	..	..
" direct	2	..	..
" double	14	..	..
" " direct	1	..	..
" infantile	4	..	..
" congenital	5	..	..
" infantile double	1	..	..
" recurrent	1	..	..
" strangulated	16	..	7
" with volvulus of omentum	1	..	..
Femoral	1	..	..
" incarcerated	1	..	..
" strangulated	3	..	1
Umbilical	8	..	1
" strangulated	3	..	2
Ventral	7	1	..
" strangulated	1	..	..
Epigastric	3	..	1
Interstitial	1	..	..
Richter's, strangulated	1	..	..
Genito-Urinary—47.			
Kidney—23.			
Perinephritic abscess	2	..	..
Pyonephrosis	3	..	1
Stricture of ureter	1	..	..
Purulent nephritis	1	..	..
Acute pyelitis	2	..	1

Genito-Urinary—*(Continued).*	Total.	No operation.	Died.
Pyonephrosis and ureteral calculus	1	..	..
Abscess of kidney	1	..	..
Renal calculi; anuria	1	..	1
Uretral calculi	2	2	..
Tuberculosis of kidney	1	..	..
Renal calculi	2	2	..
Ureteral calculi	2	2	..
Hemorrhagic nephritis	1	1	..
Movable kidney	2	..	..
Renal colic	1	1	..
Pyelonephritis	1	..	..
Renal hemorrhage	1	1	..
Bladder and Prostate—14			
Hemorrhagic cystitis	1	..	..
Cystitis and chronic urethritis	1	..	..
Hypertrophy of prostate	8	..	2
" " " and vesical calculus, cerebral apoplexy	1	..	1
" " " " suppurative orchitis	1	..	..
Prostatic abscess	1	..	..
Hemorrhagic cystitis	1	1	..
Urethra—3.			
Chronic urethritis	1	..	..
Stricture of urethra	2	..	..
Testicle and Scrotum—7.			
Hydrocele	2	..	..
Varicocele	1	..	..
Spermatocele	1	..	..
Hydrocele of cord	1	..	..
Undescended testicle	1	..	..
Acute suppurative orchitis	1	..	..
Rectum and Anus—133.			
Hemorrhoids	79	..	..
Rectal polyp	1	..	..
Fissure in ano	4	..	..
Fistula in ano	29	..	..
Venereal wart of anus	1	..	..
Perianal abscess	1	..	..
Prolapse of rectum	2	..	..
Rectal incontinence, due to laceration of sphincter	1	..	..
Perirectal abscess	1	..	..
Carcinoma of rectum	1	..	..
Stricture of rectum	1	1	..
Ischio-rectal abscess	12	..	..

	Total.	No operation.	Died.
Lower Extremity—120.			
Hip—10.			
Abscess of gluteal region	2	1	..
" pelvic, tuberculous	1	..	..
" periarticular	1	..	..
" psoas	1	..	..
Perithelioma	1	..	..
Contusion	..	1	..
Sinuses, tuberculous	1	..	..
Osteomyelitis of ilium, tuberculous	1	..	..
Thrombosis of iliac vein	1	..	..
Arthritis of hip	..	1	..
Syphilis, of iliac glands	1	..	..
Thigh—32.			
Abscess, inguinal	1	..	..
Cellulitis	1	..	..
Sinuses	2	..	..
Phlebitis, complicating endocarditis	1	..	..
Quadriceps bursitis	1	..	..
Sarcoma of fascia lata	2	..	..
Neuralgia after amputation of thigh	1	..	..
Inguinal adenitis	1	..	..
Femur, fracture of neck	6	5	1
" " with fractures of tibia, fibula and humerus	1	1	1
" chronic osteomyelitis	6	..	..
" " " head of femur	1	..	..
" osteomyelitis, tuberculous, and of pelvis	2	..	1
" " acute, arthritis of knee	1	..	..
" dislocation with osteomyelitis of ilium	1	..	..
" sarcoma	2	..	..
" " recurrent	1	..	..
" sinuses after fracture	1	1	..
Knee—17.			
Synovitis, traumatic	3	3	..
" tuberculous	1	..	..
Gumma, suppurating	1	..	..
Abscess, popliteal	1	..	..
Anchylosis	6	..	..
Bursitis, prepatellar	1	..	..
Lacerated wound	1	1	..
Internal derangement	1	1	..
Arthritis, suppurative	1	..	..
Patella, fracture; tabes	1	1	.

	Total.	No operation.	Died.
Leg—42.			
Cellulitis	3	..	..
" erysipelas	1	1	1
Burns	1	..	..
Ulcer, varicose	3	1	..
Aneurismal varix, sarcomatous degeneration	1	..	..
Varicose veins	5	..	..
Cavernous angeioma	1	..	..
Thrombosis of veins	1	..	..
Phlebitis of saphenous vein, streptococcemia	1	..	1
Lymphangitis	1	..	..
Hematoma	1	..	..
Lacerated wound	1	..	..
Gangrene, angeio-sclerotic	1	..	..
" traumatic, thrombosis of popliteal artery	1	..	..
Tibia, fracture	5	1	..
" periostitis, post typhoid	1	..	..
" osteomyelitis, chronic	4	1	..
" " tuberculous	1	..	..
" sarcoma	1	..	..
" and fibula, fracture	3	..	..
" " " " compound	2	1	..
Fibula, osteomyelitis, acute	1	..	..
Genu valgum	2	2	..
Foot and Ankle—20.			
Ankle—tuberculous arthritis	2	..	2
Foot—gangrene, diabetic	4	1	..
" " angeio-sclerotic	1	..	..
" " Raynaud's disease	3	..	..
" burns	1	1	..
Toe, gangrene, angeio-sclerotic	1	1	..
" " traumatic	1	..	..
" infected wound	1	..	..
Paronychia	2	1	..
Metatarsus, osteomyelitis	1	..	..
" exostosis of first metatarsal	1	..	..
Toe, lacerated wounds	1	1	..
Heel, ulcer, suppurative adenitis and phlebitis of groin	1	..	..
Female Genitals—22.			
Condyloma of meatus	1	..	..
Hydrocele of canal of Nuck	1	..	..
Complete laceration of perineum	1	..	..
Laceration of cervix and of perineum	1	..	..
Pelvic abscess	1	..	..

Female Genitals—*(Continued).*	Total.	No operation.	Died.
Pyosalpinx	1	..	..
Salpingo-oöphoritis	4	..	2
Ruptured ectopic gestation sac	1	..	..
Dermoid cyst and appendicitis	2	..	..
Salpingo-oöphoritis and appendicitis	1	..	..
Bilateral tubo-ovarian abscess	1	..	..
" ovarian dermoid cyst	1	..	..
Ovarian cyst	1	..	..
Adeno-carcinoma of ovaries	1	..	..
Fibroid uterus and carcinoma of cervix	1	..	..
" " " chronic appendicitis	1	..	..
" " complicating pregnancy	1	1	..
Acute salpingitis	1	1	..
Miscellaneous—20.			
Lead colic	1	1	..
Intermittent fever	2	2	..
Syringomyelia	1	1	..
Chondrodystrophia, deformity of penis	1	..	..
Syphilis, sepsis	1	1	1
Typhoid fever	1	1	..
Morbus maculosus	1	1	..
Neurasthenia	1	1	..
Hystero-epilepsy	1	1	..
Chronic nephritis, uremia	1	1	1
Multiple burns	4	2	..
Articular rheumatism	1	1	..
Furunculosis	1	..	..
Acute endocarditis	1	1	..
Cerebro-spinal syphilis	1	1	..
Multiple contusions	1	1	..

OPERATIONS PERFORMED IN THE SECOND SURGICAL DIVISION FROM DECEMBER 1, 1904, TO DECEMBER 1, 1905.

TOTAL, 841; DEATHS, 81.

Cranium and Scalp.	Total.	Died.
13 OPERATIONS.		
Craniotomy, exploratory, cerebellar tumor	1	..
" premature ossification of cranial bones	1	..

Cranium and Scalp—*(Continued)*.	Total.	Died.
Craniotomy elevation of depressed fracture	1	..
" secondary, insertion of celluloid plate	1	..
" osteoplastic, preliminary	2	..
" " intracranial neurectomy (Hartley-Krause)	2	..
Osteotomy and drainage, acute mastoiditis	1	..
" " " necrosis of frontal bone	1	..
Suture of scalp wound	3	..

Face and Mouth.

34 OPERATIONS, 4 DEATHS.

Incision and drainage, submaxillary abscess	3	..
" " cyst of superior maxilla	1	..
" " reduction, comminuted fracture of malar	1	..
" " drainage, sinus of chin	1	..
" " " peritonsillar abscess	1	..
" " " actinomycosis, inferior maxilla	1	..
" " " osteomyelitis, unerupted tooth	1	..
Excision, angeioma of forehead	1	..
" carcinoma of cheek	1	..
" submaxillary and sublingual glands	1	..
" carcinomatous submaxillary gland	1	..
" infected dentigerous cyst	1	..
" osteoma of superior maxilla	1	..
" epulis	2	..
" parotid gland, sarcoma	1	..
Osteotomy, osteomyelitis of inferior maxilla	4	..
" " " " " leukemia	1	1
Resection, of inferior maxilla	1	1
Sequestrotomy—secondary necrosis of frontal bone	1	..
Kilian's operation, for empyema of frontal, ethmoid, sphenoid and maxillary sinuses	1	..
Asch's operation, deflected septum	1	..
Plastic operation, hare lip	1	..
" " " " and cleft palate	1	1
" " lacerated wound of face	1	..
Suturing, lacerated wound of ear	1	..
Evulsion of supraorbital nerve	1	..
Staphylorrhaphy	1	..
Aspiration, of sublingual abscess	1	1

Pharynx, Larynx and Trachea.

2 OPERATIONS, 1 DEATH.

Incision and drainage, retropharyngeal abscess	1	..
" " " " " pneumonia	1	1

	Total.	Died.
Neck.		
37 OPERATIONS, 5 DEATHS.		
Incision and drainage, abscess	1	..
" " " phlegmon	1	..
" " " " ligneux (Reclus)	3	..
" " " suppurative adenitis	1	..
" " " " " tuberculous	1	..
" " " cellulitis of neck, edema of glottis	1	..
" " " retropharyngeal abscess	1	..
" " " carbuncle	1	..
Excision, glands, tuberculous	10	..
" " carcinomatous	1	..
" " " recurrent	1	1
" " endothelioma	1	..
" thyreoid cyst	2	..
" goitre, cystic and parenchymatous	2	..
" " partial	1	1
" branchiogenetic cyst	1	..
Ligation, of common carotid and subclavian arteries	1	..
Tracheotomy, retropharyngeal abscess, edema of glottis	1	1
" foreign body in bronchus	3	..
" carcinomatous glands	1	1
Thyrotomy, deep abscess, ulceration into external carotid artery, edema of larynx	1	1
Thiersch's skin grafting	1	..
Upper Extremity.		
37 OPERATIONS.		
Incision and drainage, abscess of shoulder	2	..
" " " suppurative arthritis of shoulder	1	..
" " " phlegmon of arm	1	..
" " " periarticular abscess of elbow	2	..
" " " infected wound of elbow joint	1	..
" " " tuberculous abscess of forearm	1	..
" " " cellulitis of forearm	1	..
" " " bullet wound of hand, infected	1	..
" " " cellulitis of hand	1	..
" " " phlegmon of finger	1	..
Osteotomy and drainage, osteomyelitis of humerus	1	..
" " " " " ulna	1	..
" " " necrosis of carpus	1	..
" " bone suture, fracture of neck of humerus, ununited	1	..
" " " " fracture of ulna, ununited	1	..
Excision, cysto-sarcoma of axilla, recurrent	1	..
" axillary glands, suppurative adenitis	6	..
" partial, of clavicle for fracture	1	..
" lipoma of shoulder	1	..

Upper Extremity—*(Continued).*	Total.	Died.
Excision, sarcoma of arm	1	..
" lipoma " "	1	..
" synovial sheath of wrist for tuberculosis	1	..
" carpal bones for osteomyelitis	1	..
" ganglion wrist	1	..
" metacarpus of third and fourth fingers	1	..
Amputation, of fingers for lacerated wounds	1	..
" " " " diabetic gangrene	1	..
" " " " gangrene, carbolic acid	1	..
Brisement forcé, anchylosis of elbow after fracture	1	..
Plastic, for cicatrices of axilla	1	..
Thorax.		
15 OPERATIONS.		
Thoracotomy and drainage for localized empyema	1	..
Resection of ribs and drainage for empyema	3	..
Thoracoplasty for chronic empyema	1	..
Incision and drainage for sinus of chest wall	2	..
Resection of ribs for thoracic sinus	2	..
Thoracoplasty for tuberculous sinus of chest wall	1	..
Incision and drainage of abscesses of chest wall	2	..
" " " for necrosis of rib	1	..
Skin-grafting for burn of chest and neck	1	..
Excision of lipoma of chest	1	..
Breast.		
19 OPERATIONS.		
Incision and drainage for acute mastitis	2	..
" " " " mammary abscess	2	..
" " " " bilateral suppurative mastitis	1	..
" " " and subsequent amputation of right breast for multiple miliary abscesses	1	..
Excision of keloid of breast	1	..
" " fibro-cysts of breast	1	..
" " adenoma of breast	1	..
Extirpation of inflammatory tumor of breast	1	..
Amputation of breast for carcinoma	6	..
" " " and dissection of axilla for carcinoma of breast and of cervical glands	1	..
Radical amputation of breast for tuberculosis of breast	1	..
" " " " " sarcoma of breast	1	..
Spine.		
5 OPERATIONS.		
Excision of cervical rib	1	..

	Total.	Died.
Spine—*(Continued).*		
Incision and drainage for caries of cervical vertebræ	1	..
Osteotomy and drainage for chronic osteomyelitis of sacrum	2	..
Excision of coccyx for coccygodynia	1	..
Abdominal Wall.		
5 OPERATIONS, 1 DEATH.		
Incision and drainage for abscess of abdominal wall	2	1
" " " " intra-abdominal abscess	1	..
" " " " extraperitoneal abscess	1	..
Excision of hemorrhagic cyst of abdominal wall	1	..
General Abdominal Cavity.		
13 OPERATIONS, 5 DEATHS.		
Incision and removal of extraperitoneal inflammatory mass	1	..
" " drainage for subphrenic and retroperitoneal abscess	1	..
" " " " retrocolic abscess	1	1
" " " " intra-abdominal abscess	1	..
Exploratory laparotomy (typhoid fever)	1	..
" " for acute gonococcus peritonitis	1	..
" " " chronic peritonitis	1	1
Laparotomy and division of bands for chronic intestinal obstruction	1	..
" " loosening of intestinal adhesions	1	..
" " drainage for pneumococcus peritonitis	2	2
Transpleural incision of diaphragm for subphrenic abscess	1	1
Exploration of chest wound; laparotomy and suture of perforation of stomach wall; transpleural thoracotomy and drainage of abscess of liver and subphrenic abscess; removal of bullet from subphrenic space	1	..
Esophagus and Stomach.		
19 OPERATIONS, 8 DEATHS.		
Esophagotomy and extraction of foreign body	1	..
Partial gastrectomy and anterior gastro-jejunostomy for carcinoma of stomach	1	1
Partial gastrectomy and posterior gastroenterostomy for carcinoma of pylorus	1	1
Gastrostomy for malignant stricture of esophagus	2	1
" " carcinoma of cardia	1	..
" " " " pylorus	1	..
" (Kader) for carcinoma of esophagus	1	..
Gastroduodenostomy (Finney) for stenosis of pylorus with gastroptosis	1	1
Maury's suture gastroenterostomy for pyloric stenosis	1	..
" " " " " and periduodenal abscess	1	1

Esophagus and Stomach—*(Continued).*	Total.	Died.
Maury's posterior gastroenterostomy for gastric carcinoma	1	1
Gastroenterostomy for ulcers	1	..
" " gastric dilatation and gastroptosis	1	1
Posterior gastroenterostomy (Murphy button) for pyloric stenosis	1	..
" " for malignant stenosis of duodenum, general abdominal carcinomatosis	1	1
Secondary gastroenterostomy for stenosis of pylorus and gastro-intestinal stoma	1	..
Exploratory laparotomy for carcinoma of stomach	2	..
Liver.		
7 OPERATIONS, 4 DEATHS.		
Exploratory laparotomy for hepatic carcinoma	1	1
" " " sarcoma of liver	1	1
Incision and drainage of abscess of liver	1	..
Transpleural thoracotomy and hepatotomy for liver abscess	1	..
Incision and drainage for multiple liver abscesses with subhepatic abscess	1	1
Preliminary cholecystostomy for obstructive jaundice	1	1
Omentopexy for hepatic cirrhosis	1	..
Gall-Bladder and Ducts.		
34 OPERATIONS, 10 DEATHS.		
Incision and drainage for pericholecystitis	1	..
Cholecystotomy and drainage for acute pancreatitis	1	..
" " colostomy for cholecystitis, cholelithiasis, intestinal obstruction and general peritonitis	1	1
Cholecystectomy for chronic cholecystitis, cholelithiasis	1	..
Cholecystectomy and drainage for acute cholecystitis	1	..
" " " " chronic cholecystitis and cholelithiasis	6	..
" " " " chronic cholecystitis	1	..
" " " " acute cholecystitis and cholelithiasis	3	..
" " " " " gangrenous cholecystitis and cholelithiasis	2	1
" " " " persistent biliary fistula after cholecystostomy	1	1
" " " " gangrenous cholecystitis and pancreatitis	1	1
" " choledochotomy for acute cholecystitis and cholelithiasis	3	1
" " choledochotomy for chronic cholecystitis and cholelithiasis	5	1
Secondary cholecystectomy for cholelithiasis and biliary fistula	1	..
" " and choledochotomy	1	1
Choledochotomy and drainage of common, hepatic and cystic ducts	2	2

Gall-Bladder and Ducts—*(Continued).*	Total.	Died.
Choledochotomy with hepatocotomy and drainage for stricture of common duct	1	1
Transduodenal choledochotomy for calculus in papilla of Vater	1	..
Retroduodenal choledochotomy following cholecystectomy for stone in common duct	1	..
Intestines.		
14 OPERATIONS, 7 DEATHS.		
Incision and drainage for tuberculous abscess of intestine and colon	1	1
Exploratory laparotomy for intussusception	1	1
" " " intestinal obstruction	2	2
" " " carcinoma of sigmoid flexure	1	..
Laparotomy for acute intestinal obstruction by bands	1	..
" and appendicectomy for hemorrhagic peritonitis and acute appendicitis	1	..
Excision of cecum, ileocolic button anastomosis	1	1
Intestinal resection for colloid carcinoma of sigmoid flexure	1	..
" " of sigmoid flexure for malignant stricture	1	1
Enterostomy for acute intestinal obstruction	1	..
" " " " " volvulus after appendicectomy	1	..
Enteroenterostomy for gangrene of small intestine and strangulation of Meckel's diverticulum	1	1
Closure of fecal fistula following appendicitis	1	..
Appendix		
180 OPERATIONS, 13 DEATHS.		
Appendicectomy for acute catarrhal appendicitis	24	..
" and drainage for acute catarrhal appendicitis	2	..
" " " " " appendicitis with abscess	12	..
" for acute ulcerative appendicitis	3	..
Incision and drainage for acute appendicitis with abscess	6	..
Multiple incisions and drainage for appendicitis abscess, general peritonitis	1	1
Appendicectomy for acute hemorrhagic appendicitis	1	..
" " " gangrenous appendicitis	7	..
" and drainage for acute gangrenous appendicitis	23	..
" " " " gangrenous appendicitis with abscess	22	3
" " " " gangrenous appendicitis with serous peritonitis	3	..
" " " " gangrenous appendicitis with sero-purulent peritonitis	6	2
" " " " gangrenous appendicitis with purulent peritonitis	9	6
" " " " gangrenous appendicitis, gangrene of cecum	1	1

	Total.	Died.
Appendix—*(Continued).*		
Appendicectomy for chronic appendicitis	44	..
" and drainage for chronic appendicitis	3	..
" " " " adeno-carcinoma of appendix	1	..
" for empyema of appendix	4	..
Excision of sinus after appendicectomy	1	..
Laparotomy and division of adhesions after appendicectomy	5	..
" for primary lympho-sarcoma of appendix with metastases	1	..
Incision and drainage of bilateral gangrenous parotitis following acute gangrenous appendicitis	1	..
Hernia.		
110 OPERATIONS, 11 DEATHS.		
Hernioplasty for congenital inguinal	5	..
Halsted-Bassini for infantile	5	..
Bassini for inguinal	17	..
Halsted-Bassini for inguinal	17	..
Bassini for double inguinal	13	..
Halsted-Bassini for double inguinal	1	..
Hernioplasty for inguinal and hydrocele	3	..
Halstead for irreducible infantile	2	..
Herniotomy for strangulated inguinal and intestinal obstruction	2	2
" " " " —secondary resection of intestine	1	1
" and drainage for strangulated inguinal	12	3
" for strangulated inguinal—resection for gangrene of small intestine	1	1
Bassini for recurrent inguinal	1	..
Hernioplasty for inguinal and laparotomy for volvulus of omentum	1	..
" and salpingo-oöphorectomy for ventral hernia and ovarian cyst	1	..
" and appendicectomy for double inguinal hernia and chronic appendicitis	1	..
Hernioplasties and silver wire filigree for epigastric and inguinal (pneumonia)	1	1
Bassini for femoral	1	..
" " irreducible femoral	1	..
" " strangulated femoral	3	..
Hernioplasty for umbilical	6	1
Mayo's operation for umbilical	1	..
Hernioplasty for strangulated umbilical	2	1
" " " " —resection of gangrenous volvulus of small intestine	1	1
" " epigastric	2	..
" " umbilical and ventral	1	..
" " post-operative ventral	4	..
" and silver filigree for ventral	1	..

Hernia—*(Continued).*	Total.	Died.
Hernioplasty and silver filigree, resection of intestine for post-operative ventral hernia and gangrene of intestine	1	..
Halsted for interstitial	1	..
Hernioplasty and partial resection of intestine for strangulated Richter's hernia	1	..

Genito-Urinary Diseases.

40 OPERATIONS, 6 DEATHS.

Kidney—15.

Nephropexy for movable kidney	2	..
Nephrotomy for pyonephrosis	1	..
" " purulent nephritis	1	..
" " acute pyelitis	2	1
" " pyonephrosis and ureteral calculus	1	..
" " abscess of kidney	1	..
" bilateral for renal calculi; anuria	1	1
Nephrectomy for pyonephrosis	2	1
" (secondary) for tuberculosis	1	..
Exploratory nephrotomy for ureteral obstruction	1	..
Incision and drainage for perinephric abscess	2	..

Bladder and Prostate—13.

Suprapubic cystotomy for hemorrhagic cystitis	1	..
" " " chronic urethritis	1	..
" prostatectomy for hypertrophied prostate	8	2
" " " " " vesical calculus; cerebral apoplexy	1	1
Suprapubic prostatectomy and partial orchidectomy for hypertrophied prostate and suppurative orchitis	1	..
Incision and drainage prostatic abscess	1	..

Urethra and Penis—8.

Internal and external urethrotomy for stricture	2	..
Dilatation for stricture of urethra	1	..
Urethroplasty following prostatectomy	1	..
Plastic on penis for hyperplasia	2	..
Meatotomy for hypospadias	1	..
Circumcision	1	..

Testicle and Cord—4.

Excision of hydrocele of cord and hernioplasty	1	..
Orchidopexy and double Bassini for undescended testes and enlarged inguinal rings	1	..

Testicle and Cord—*(Continued).*	Total.	Died.
Excision of sac for spermatocele	1	..
" " veins for varicocele	1	..
Rectum and Anus.		
132 OPERATIONS.		
Clamp and cautery for hemorrhoids	72	..
Incision for hemorrhoids	2	..
Ligature and excision for hemorrhoids	3	..
Ligation and clamp and cautery for hemorrhoids	1	..
Clamp and cautery for strangulated hemorrhoids	1	..
Excision of rectal polyp and hemorrhoidal tabs	1	..
Dilatation of sphincter for fissure in ano	1	..
Incision and drainage for fissure in ano	1	..
Stretching of sphincter under anesthesia for rectal tenesmus and neurasthenia	2	..
Excision of venereal wart of anus	1	..
Incision and drainage for fistula in ano	16	..
Excision " " " " " "	2	..
" " suture " " " "	10	..
" partial suture for multiple fistulæ in ano	1	..
Incision and drainage of peri-anal abscess	1	..
Cauterization for prolapse of rectum	1	..
Excision for prolapse of rectum	1	..
Plastic on sphincter ani for rectal incontinence	1	..
Incision and drainage of isĉhio-rectal abscess	12	..
" " " " pelvic abscess	1	..
Right inguinal colostomy, carcinoma of rectum	1	..
Female Genitals.		
20 OPERATIONS, 2 DEATHS.		
Excision of condylomata of meatus	1	..
" for hydrocele of canal of Nuck	1	..
Plastic for complete laceration of perineum—incontinence	1	..
Plastic amputation of cervix for cystocele and rectocele, laceration of cervix	1	..
Rectal incision and drainage of pelvic abscess	1	..
Salpingectomy for pyosalpinx	1	..
Salpingo-oöphorectomy for salpingo-oöphoritis	2	1
" " " chronic salpingitis	1	1
" " " ruptured ectopic gestation sac	1	..
" " and resection of phalangeal joint for gonorrheal tubo-ovarian abscess and gonorrheal arthritis of interphalangeal joint	1	..
" " and appendicectomy for twisted ovarian dermoid cyst and appendicitis	1	..
" " and appendicectomy for dermoid cyst of left ovary and appendicitis	1	..

Female Genitals—*(Continued).*	Total.	Died.
Cholecystectomy, choledochotomy and drainage for impacted stone in chronic appendicitis	1	..
Double salpingo-oöphorectomy for bilateral tubo-ovarian abscess	1	..
" " " " double ovarian dermoid cyst	1	..
Oöphorectomy for ovarian cyst	1	..
Pan-hysterectomy for adeno-carcinoma of ovaries	1	..
" " " fibroid uterus and carcinoma of cervix	1	..
" " " " " —appendicectomy for chronic appendicitis	1	..
Lower Extremity.		
94 OPERATIONS, 4 DEATHS.		
Incision and drainage, gluteal abscess	1	..
" " " psoas abscess	1	..
" " " inguinal abscess	2	..
" " " sinuses of hip, tubercular	1	..
" " " " " " ilium, tubercular	1	..
" " " periarticular abscess of hip	2	..
" " " cellulitis of thigh	2	..
" " " persistent sinuses of thigh	3	..
" " " bursitis, prepatellar	1	..
" " " abscess, popliteal	1	..
" " " gumma, suppurating, of knee	1	..
" " " osteomyelitis of femur	2	..
" " " periostitis of tibia, typhoid	1	..
" " " phlebitis of leg, suppurative	2	..
" " " cellulitis of leg	4	1
" " " phlebitis of saphena, streptococcemia	2	1
" " " infected thrombosed veins of leg	1	..
Osteotomy and drainage, osteomyelitis of head of femur	3	1
" " " " " femur, chronic	4	..
" " " tuberculous osteomyelitis of tibia	1	..
" " " fracture of tibia, compound	1	..
" " " osteomyelitis of fibula	1	..
" " " " " metatarsus	1	..
" bone wax filling, chronic osteomyelitis of femur	2	..
" " " " " " " tibia	1	..
" (Neuber), chronic osteomyelitis of tibia	1	..
" osteomyelitis of ilium, dislocation of femur	1	..
Excision, inguinal glands	2	..
" sciatic nerve for traumatic neuralgia	1	..
" recurrent sarcoma of thigh	2	..
" sarcoma of thigh	1	..
" " " fascia lata	1	..
" " " femur	1	..
" and Thiersch's skin grafting, varicose ulcer of leg	1	..
" varicose veins of leg	4	..

	Total.	Died.
Lower Extremity—*(Continued).*		
" aneurismal varix (sarcomatous)	1	..
" exostosis of metatarsal bone	1	..
" ingrown toe-nail	2	..
Arthrotomy, of knee-joint, tuberculosis	2	..
" " " suppuration	2	..
Resection, of hip joint for suppurative arthritis	1	..
" " ankle for tuberculous arthritis	2	..
Amputation, of thigh, tuberculosis of tibia and knee	1	..
" " " sarcoma of tibia	1	..
" " " osteomyelitis of femur	1	..
" " " traumatic gangrene	1	..
" " " gangrene of foot, diabetic	1	1
" " leg, osteoplastic, tuberculous ostitis of ankle	1	..
" " " " Raynaud's disease	3	..
" " " " diabetic gangrene	1	..
" " " " arterio-sclerotic gangrene of foot	2	..
" " foot, Raynaud's disease	1	..
" " toe, infected wound	1	..
" " " traumatic gangrene	1	..
Reamputation, of leg, osteomyelitis of tibia	1	..
Curetting, of sinuses of femur	1	..
Open operation, nailing of fragment, united fracture of neck of femur	1	..
Brisement forcé, anchylosis of knee	7	..
Tenotomy, of hamstring muscles	1	..
Miscellaneous.		
10 OPERATIONS.		
Incision and drainage, furunculosis	1	..
Thiersch's skin grafting	9	..

DISEASES TREATED IN THE SECOND SURGICAL DIVISION,

From December 1, 1905, to December 1, 1906.

HOWARD LILIENTHAL, M.D.,
ATTENDING SURGEON.

CHARLES A. ELSBERG, M.D., JOSEPH WIENER, JR., M.D.,
ADJUNCT ATTENDING SURGEONS.

Total, 1129.

	Total.	No operation.	Died.
Cranium—14.			
Brain, tumor	1	1	..
" cyst	1	..	1
" abscess	1	..	1
" " extradural	1	..	1
" apoplexy	1	1	1
Skull, depressed fracture	2	..	..
" fracture, vertex	1	1	..
" " " and base	1	1	1
" " compound	1	..	1
" metastatic sarcoma	1	..	..
" necrosis of frontal bone	1	1	..
Scalp, sebaceous cyst	1	..	..
Arterio-venous aneurism of carotid artery and jugular vein	1	1	..
Face and Mouth—34.			
Lip—2.			
Angeioma	1	..	..
Carbuncle	1	..	..
Nose—4.			
Deviation of septum	1	..	..
Epistaxis	1	1	..
Deformity	1	..	..
Gumma	1	1	..
Face—7.			
Phlegmon	2	..	..
Sarcoma	1	..	1
Paralysis of facial nerve	1	..	..
Parotid cyst	1	1	..
Fibroma of auricle	1	..	..
Angeioma of eyelid	1	..	..

	Total.	No operation.	Died.
Superior Maxilla—2.			
Osteomyelitis	1	..	..
Empyema of antrum of Highmore	1	..	..
Inferior Maxilla—13.			
Osteomyelitis	7	..	..
Periostitis	2	1	..
Fracture	1	1	..
Carcinoma	1	..	1
Cyst	1	..	1
Anchylosis—bilateral	1	..	..
Oral Cavity—6.			
Epulis	3	..	..
Carcinoma of tongue	1	..	..
Perforation of soft palate, syphilitic	1	..	..
Salivary calculus	1	1	..
Pharynx, Larynx and Trachea—9.			
Pharnyx, fibro-myxoma	1	..	..
" retropharyngeal abscess	3	..	..
Larynx, carcinoma	2	..	1
" epiglottiditis	1	1	..
Trachea, fibroma of	1	..	..
" granulation tumor after tracheotomy	1	..	..
Neck—41.			
Abscess	10	1	1
Carbuncle, diabetic	1	..	1
Cellulitis	2	..	..
Ulcer	1	1	..
Gumma	1	1	..
Chondro-sarcoma	1	..	..
Lipoma	2	..	..
Endothelioma	1	..	..
Lympho-sarcoma of glands	1	..	..
Recurrent sarcoma of glands	2	1	..
Tubercular adenitis	9	..	..
Dermoid cyst	1	..	..
Thyroglossal cyst	2	..	..
Goitre, cystic	3	..	..
" colloid	1	..	..
" exophthalmic	1	..	..
Metastatic carcinoma of glands	2	..	..

Upper Extremity—63.	Total.	No operation.	Died.
Shoulder—8.			
Abscess	3	..	..
Anchylosis	1	..	..
Lipoma	2	..	..
Sarcoma	1	..	..
Fracture of clavicle	1	1	..
Axilla—7.			
Abscess	4	1	..
Adenitis, tubercular	2	..	..
Neuro-fibroma	1	..	..
Arm—10.			
Osteomyelitis of humerus	4	..	..
Fracture of humerus	3	3	..
Osteochondroma	1	..	..
Osteosarcoma	1	..	..
Subpectoral abscess (streptococcemia)	1	..	..
Forearm—24.			
Cellulitis, and of hand	14	3	2
Lacerated wounds	1	..	..
Fracture, of radius	1	..	..
" " " malunited	2	..	..
" " " Colles'	1	1	..
" " " and of ulna, ununited	1	..	..
Elbow, dislocation, compound	1	..	..
" tuberculosis	2	..	..
" cicatricial contracture	1	..	..
Hand—14.			
Abscess	1	..	..
Wound, lacerated, of fingers	2	..	..
Gangrene, of fingers, due to carbolic acid	1	..	..
Carpal bones, necrosis	1	..	..
Wrist, dislocation, compound	1	..	..
Metacarpus, osteomyelitis	2	..	..
Phalanges, osteomyelitis	5	..	..
Thumb, angeioma	1	..	..
Breast—30.			
Fibro-adenoma	3	..	..
Carcinoma	7	..	1

Breast—*(Continued).*	Total.	No operation.	Died.
Abscess	9	..	..
Recurrent carcinoma	3	..	1
Adeno-carcinoma	2	..	..
Cyst	1	..	..
Infected galactocele	1	..	..
Tuberculosis	1	..	..
Fibro-cyst	1	..	..
Carcinoma and metastasis in liver	1	..	..
Intracanalicular fibroma	1	..	..
Thorax—37.			
Fracture of ribs	1	1	..
Tuberculous osteomyelitis of vertebra	1	1	..
Sinus after empyema	5	1	..
Abscess of chest wall	1	..	..
Empyema	11	..	..
Foreign body in chest wall	2	..	..
Dry pleurisy	1	1	..
Varicose veins of chest wall	1	..	..
Necrosis of rib	2	..	..
Lipoma of back	2	..	..
Abscess of the lung	1	..	..
Tuberculous ribs and sternum	1	..	..
Localized empyema, parenchymatous nephritis	1	..	..
Carbuncle of back	1	..	..
Contusion of sternum	1	..	..
Angeiosarcoma of back	1	..	..
Tumor of chest wall	1	..	1
Foreign body in bronchus	2	..	..
Empyema, gangrene of lung	1	..	..
Esophagus and Stomach—19.			
Carcinoma of esophagus	8	3	2
Hypertrophic pyloric stenosis	1	..	..
Stricture of esophagus	1	..	..
Gastro-duodenitis	1	1	..
Gastric neurosis	1	1	..
Carcinoma of stomach	3	1	1
Benign stenosis of pylorus	1	..	..
Ulcer of stomach	1	..	..
" " " with lobar pneumonia	1	..	1
Foreign body (open safety pin) in esophagus	1	..	..
Pancreas—5.			
Acute hemorrhagic pancreatitis	4	1	..
Pancreatic cyst (post-operative mania)	1	..	..

	Total.	No operation.	Died.
Spleen—5.			
Rupture of spleen	3	..	..
Cystic tumor	1	..	..
Splenomegaly	1	1	..
Liver—7.			
Cirrhosis of liver	3	3	..
Abscess of liver	2	..	..
Liver abscess with secondary subphrenic abscess—ulcer of rectum	1	..	1
Amebic abscess of liver	1	..	..
General Abdominal Cavity and Abdominal Wall—20.			
Visceral crisis, erythema group	2	..	..
Inflammatory omental tumor	1	..	..
Post-operative adhesions	4	3	..
Abscess of abdominal wall	2	..	..
Abdominal carcinomatosis	1	..	..
Lumbar abscess	1	..	..
Abdominal tumor	1	..	..
Fibroma of abdominal wall	2	..	..
Tuberculous peritonitis	1	..	..
Stab-wound of abdominal wall	1	1	..
Multiple sarcomata of peritoneum	1	..	1
General purulent peritonitis	1	1	1
Lumbar sinus	1	..	..
Abscess of abdominal wall due to perforation of sigmoid flexure by foreign body (toothpick)	1	..	..
Gall-Bladder and Ducts—35.			
Acute cholecystitis, cholangeitis	1	..	1
" "	1	..	..
" " cholelithiasis	6	..	1
Chronic cholecystitis, stone in common duct	1	..	..
" " cholelithiasis	5	..	1
Cholelithiasis	1	..	..
" cholangeitis	1	..	1
Gangrenous cholecystitis, cholelithiasis	8	..	2
" perforative cholecystitis, lobar pneumonia	1	..	1
Empyema of gall-bladder, pericholecystic abscess	2	..	..
" " " " " cholelithiasis	1	..	1
Adhesions after cholecystectomy	1	..	..
Papillary adenoma of gall-bladder and liver	1	..	1
Persistent biliary fistula	1	..	1
Obstruction to common duct	1	..	1
Impacted stone in common duct	1	..	1

Gall-Bladder and Ducts—*(Continued).*	Total.	No operation.	Died.
Adhesions around gall-bladder	1	..	..
Hydrops vesicæ fellæ with cholelithiasis and carcinoma of head of pancreas	1	..	1
Intestines—39.			
Acute intestinal obstruction due to gall-stones	1	..	..
Intestinal obstruction due to bands	6	..	1
Chronic colitis	1	..	..
Ulcerative colitis	3	..	..
Intestinal obstruction	4	..	1
Tumor of cecum	1	..	..
Intestinal colic	4	4	..
Traumatic rupture of intestine; general peritonitis	1	..	1
Carcinoma of sigmoid; perforation; peritonitis	1	..	1
Volvulus due to Meckel's diverticulum	1	..	1
Carcinoma of intestine	1	..	1
Chronic intestinal obstruction	2	1	..
Recurrent volvulus of sigmoid flexure	1	..	..
Ileo-cecal intussusception	2	..	..
Volvulus of small intestine	2	1	2
Sarcoma of intestine	1	..	..
Gangrene of cecum	1	..	1
Tumor of ileo-cecal junction	1	..	1
Carcinoma of transverse colon	1	..	1
Diaphragmatic hernia; intestinal obstruction	1	..	1
Carcinoma of sigmoid flexure	1	..	1
Perforation of small intestine by fishbone	1	..	1
Perforated duodenal ulcer	1	..	..
Appendix—242.			
Gangrenous appendicitis with abscess	47	..	1
Chronic appendicitis	52	..	..
Acute appendicitis with abscess	22	..	1
Empyema of appendix	9	..	..
Acute catarrhal appendicitis	49	5	..
Subacute appendicitis	5	..	..
Fecal fistula post appendicitis	1	..	..
Gangrenous appendicitis	22	..	1
" perforative appendicitis with serous peritonitis	15	..	..
" appendicitis with gangrene of cecum	2	..	1
Subphrenic abscess secondary to gangrenous appendicitis	1	..	..
Gangrenous appendicitis; diffuse purulent peritonitis; pelvic abscess	1	..	..
Gangrenous appendicitis; diffuse purulent peritonitis	14	..	9
" appendicitis and secondary intestinal obstruction	1	..	..
Acute gangrenous appendicitis with sero-purulent peritonitis, and secondary pelvic abscess, and multiple abscesses of liver	1	..	1

	Total.	No operation.	Died.
Hernia—111.			
Inguinal, indirect	58	4	..
" " double	5	..	..
" infantile	1	..	..
" congenital	3	..	..
" " and undescended testis	1	..	..
" direct	2	..	..
" " double	1	..	..
" incarcerated	4	..	..
" " congenital	1	..	..
" strangulated	6	..	1
" " fecal extravasation	1	..	1
" " general peritonitis	1	..	1
Femoral	2	..	..
" incarcerated	2	..	..
" strangulated	6	..	1
Umbilical	4	2	..
" strangulated	2	..	1
Epigastric	1	..	..
Ventral	7	1	..
" strangulated	2	..	..
" with acute intestinal obstruction	1	..	..
Genito-Urinary—65.			
Kidney—33.			
Multilocular cyst of kidney	1	..	..
Movable kidney	2	..	..
Hematuria	1	1	..
Ureteral calculus	7	3	..
Sinus following nephrectomy	1	1	..
Unilateral hemorrhagic nephritis	2	..	..
Pyelitis	2	2	..
Perinephritic abscess	1	..	..
Renal calculus	2	1	..
Tuberculous kidney	2	..	..
Ureteral calculi; pyonephrosis	2	1	..
Renal colic	2	2	..
Renal calculus; gonorrheal urethritis	1	..	1
Pyonephrosis	2	..	1
Pyelonephritis	1	..	1
Renal and ureteral calculi	1	..	..
Suppurative nephritis	1	..	..
Chronic pyonephrosis	1	..	1
Multiple abscesses of kidney	1	..	..

	Total.	No operation.	Died.
Bladder—6.			
Ulcer of bladder	1	..	..
Ulcerative cystitis	1	..	..
Cystitis	1	1	..
Carcinoma of bladder	1	..	..
Incontinence, due to paralysis of vesical sphincter	1	1	..
Vesical calculus	1	..	..
Prostate—11			
Hypertrophy of prostate	8	..	1
Malignant adenoma	1	..	..
Hypertrophy of prostate and vesical calculi	2	..	..
Urethra—9.			
Gonorrheal urethritis	1	..	..
Hypospadias	3	..	..
Urethral fistula	2	..	..
Stenosis of urethra	2	..	..
Urethral calculus	1	..	..
Testicle and Scrotum—6.			
Tuberculosis of testis and inguinal glands	1	..	..
Hydrocele	1	..	..
Undescended testis	1	..	..
Tuberculosis of testis	1	..	..
Varicocele	2	..	..
Female Genitals—39.			
Diseased adnexa	1	..	..
Retroversion of uterus	3	..	..
Fibroid uterus	2	..	..
Bilateral salpingo-oöphoritis	2	1	..
Gonorrheal salpingitis	1	1	..
Double ovarian cyst	1	..	..
Dermoid cyst of ovary	2	..	..
Chronic endometritis	3	..	..
Laceration of cervix	1	..	..
Double suppurative salpingo-oöphoritis with diffuse purulent peritonitis	1	..	..
Carcinoma of ovary; cerebral embolism	1	..	1
Ovarian cyst	3	..	..
" " with twisted pedicle	2	..	..
Urethral caruncle	1	..	..
Granular cystitis	1	1	..
Ulcer of urethra	1	1	..

Female Genitals—*(Continued).*	Total.	No operation.	Died.
Pelvic exudate	1	1	..
Traumatic ulcer of urethra and bladder	1	1	..
Epithelial carcinoma of vulva	1	..	..
Bilateral pyosalphinx	1	..	..
Dysmenorrhea	1	1	..
Pyosalpinx	1	..	..
Angeio-sarcomata of vulva and uterus	1	..	1
Bilateral tubo-ovarian abscess	1	..	..
Tuberculosis of uterus and adnexa	1	..	..
Salpingo-oöphoritis	1	..	..
Ruptured ectopic gestation sac	1	..	..
Carcinoma of uterus	1	..	..
Ovarian fibroid	1	..	1
Rectum and Anus—169.			
Hemorrhoids	80	2	..
" and fistula in ano	3	..	..
Luetic stricture of rectum	2	1	..
Perirectal abscess	5	..	..
Ischio-rectal abscess	10	..	..
Fistula in ano	29	1	..
Fissure in ano	11	..	..
Prolapse of rectum	2	1	..
Carcinoma of rectum	8	3	1
Syphilis of rectum	2	2	..
Rectal incontinence	1	..	..
Stricture of rectum	3	..	..
Periproctitis	1	1	..
Eczema of anus	1	1	..
Papillomata of rectum	1	..	..
Rectal polyp	8	..	..
Congenital atresia ani	1	..	..
Sarcoma of rectum	1	..	..
Lower Extremity—103			
Hip—17.			
Abscess of groin	6	..	..
Tumor " "	1	..	..
Buttock, abscess	4	..	..
" lipoma	2	1	..
Ilium, osteomyelitis	1	..	..
Sacro-iliac joint, tuberculosis	1	1	..
Perineum, lacerated wound	1	..	..
Buttock, carbuncle	1	..	..

	Total.	No operation.	Died.
Thigh—23.			
Abscess	2	..	..
" cold	1	..	..
Gumma, suppurating	1	..	..
Phlegmon	1	..	..
Burns	1	..	..
Angeioma	2	..	..
Carcinoma, metastatic	1	..	..
Femur, fracture	4	2	..
" " of neck	1	1	..
" " compound, sepsis	1	1	1
" osteomyelitis, acute	1	..	..
" " chronic	4	1	..
" sarcoma	1	..	1
Internal saphenous vein, septic thrombosis	1	..	1
Quadriceps bursitis	1	..	..
Knee—18.			
Synovitis, traumatic	2	2	..
Ganglion	1	..	..
Tuberculous arthritis	6	..	..
Charcot's joint, infcctcd	1	..	..
Syphilitic ulcer	1	..	..
Internal derangement	1	..	..
Popliteal space, abscess	1	..	..
" " fibroma	1	..	..
Patella, fracture	3	1	..
" habitual dislocation	1	..	..
Leg—29.			
Abscess	2	..	..
Cellulitis	2	1	..
Sarcoma	1	..	..
Cavernous angeioma	1	..	..
Phlebitis	3	3	..
Varicose veins	4	1	..
Gangrene, arterio-sclerotic	1	..	..
" " " mesenteric thrombosis	1	..	1
Tibia, osteomyelitis	5	..	..
" " tuberculous, tuberculous meningitis	1	..	1
" fracture	1	1	..
" and fibula, fracture	2	2	..
" " " " compound	3	2	..
Fibula, fracture, Pott's	2	2	..
Foot and Ankle—16.			
Ankle, sprain	2	2	..

Foot and Ankle—(Continued.)	Total.	No operation.	Died.
Ankle, anchylosis	1	1	..
" tuberculosis	1	..	..
Foot, gangrene, angeio-sclerotic	3	1	2
" " diabetic	1	..	1
" " Raynaud's	1	..	..
Lacerated wound	1	1	..
Toe, gangrene, diabetic	1	1	..
" ingrown nail	2	..	..
Metatarsus, fracture	1	1	..
" osteomyelitis	2	..	..
Miscellaneous—42.			
Neurasthenia	8	8	..
Burns of arms and face.	2	1	..
Multiple burns	11	6	2
Acute bronchitis	2	2	..
Pulmonary tuberculosis	1	1	..
Intercostal neuralgia	2	1	..
Malignant endocarditis	2	1	..
Hemophilia of new-born	2	1	..
Sexual hypochondria	2	2	..
Tuberculous meningitis	2	1	1
Contusions of face and leg	2	1	..
Tuberculosis	1	1	..
Auto-intoxication	2	2	..
Aortic insufficiency	1	1	..
Acute pericarditis	1	1	..
Hemorrhage from tooth-socket—hemophilia	1	1	..

OPERATIONS PERFORMED IN THE SECOND SURGICAL DIVISION FROM DECEMBER 1, 1905, TO DECEMBER 1, 1906.

TOTAL, 934; DEATHS, 71.

Cranium and Scalp. 8 OPERATIONS, 4 DEATHS.	Total.	Died.
Craniotomy for brain cyst	1	1
" " " abscess	1	1
" " " " extradural	1	1
" depressed fracture of skull	2	..

	Total.	Died.
Cranium and Scalp—*(Continued).*		
Cranitomy compound fracture of skull	1	1
Exploratory incision metastatic sarcoma of skull	1	..
Excision of sebaceous cyst	1	..
Face and Mouth.		
28 OPERATIONS, 2 DEATHS.		
Angeioma of lip, cauterization	1	..
Carbuncle of lip, incision	1	..
Deviation of nasal septum, Asch's operation	1	..
Deformity of nose, plastic operation	1	..
Abscess of face, incision and drainage	2	..
Sarcoma of face, ligation of external carotid artery	1	1
Facial palsy, spinal accessory, facial nerve anastomosis	1	..
Fibroma of auricle, excision	1	..
Angeioma of lid, cauterization	1	..
Osteomyelitis of superior maxilla, osteotomy, drainage	1	..
Empyema of antrum, drainage	1	..
Osteomyelitis of inferior maxilla	8	..
Carcinoma of inferior maxilla, resection	1	1
Cyst of inferior maxilla, excision	1	..
Anchylosis, resection of condylar processes	1	..
Epulis, excision	3	..
Carcinoma of tongue, Kocher's operation	1	..
Perforation of palate, syphilitic, staphylorrhaphy	1	..
Pharynx, Larynx and Trachea.		
5 OPERATIONS.		
Excision of fibro-myoxoma of pharynx	1	..
Incision and drainage, retropharyngeal abscess	3	..
Excision of larynx, carcinoma	1	..
Neck.		
38 OPERATIONS, 2 DEATHS.		
Incision and drainage of abscess	8	1
" " " carbuncle, diabetic	1	1
" " " cellulitis	2	..
Excision, chondro-sarcoma	1	..
" lipoma	2	..
" partial, of endothelioma	1	..
" " lymphosarcoma	1	..
" recurrent sarcoma	1	..
" tuberculous glands	9	..
" dermoid cyst	1	..
" thyroglossal cyst	2	..

	Total.	Died.
Neck—*(Continued).*		
Excision, metastatic carcinomatous glands	2	..
" cystic goitre	3	..
" colloid goitre	1	..
" partial, of goitre, exophthalmic	1	..
Tracheotomy, excision of fibroma of trachea	1	..
" " " granulation tumor	1	..
Upper Extremity.		
49 OPERATIONS, 1 DEATH.		
Incision and drainage, abscess of axilla	3	..
" " " cellulitis of hand	9	..
" " " " " shoulder	3	..
" " " " " of forearm	2	..
" " " subpectoral abscess	1	1
" " " osteomyelitis of finger	2	..
Osteotomy and drainage, osteomyelitis of humerus	3	..
" " " " " radius	1	..
" " " " " metacarpus	2	..
" malunited fracture of radius	1	..
Excision, lipoma of shoulder	2	..
" sarcoma of shoulder	1	..
" osteosarcoma of humerus	1	..
" osteochondroma of humerus	1	..
" neuro fibroma of axilla	1	..
" angeioma of thumb	1	..
" tuberculous glands of axilla	2	..
Osteoclasis, malunited fracture of radius	1	..
Wiring, ununited fracture of olecranon	1	..
Introduction of internal aluminum splint for fracture of radius	1	..
Brisement forcé, anchylosis of shoulder	1	..
Reduction and suture, compound dislocation elbow	1	..
Resection, radius and ulna, compound dislocation of wrist	1	..
Amputation, of finger, osteomyelitis	1	..
" " " carbolic gangrene	1	..
Resection, of elbow for tuberculosis	2	..
Suture, lacerated wound of forearm	1	..
Tenorrhaphy, lacerated wound of finger	1	..
Skin-grafting, cicatricial contracture of elbow	1	..
Thorax.		
29 OPERATIONS, 3 DEATHS.		
Thoracotomy and drainage for empyema	12	1
Thoracotomy and drainage for localized empyema, nephritis	1	1
Thoracotomy and drainage for empyema, gangrene of lung	1	1
Thoracoplasty for empyema sinus	3	..
Resection of rib for necrosis	2	..
Osteotomy and drainage for tuberculosis of rib and sternum	1	..

Thorax—*(Continued).*	Total.	Died.
Incision and drainage of abscess of chest wall	1	..
Removal of foreign body from chest wall	2	..
Excision of varicose veins of chest wall	1	..
Excision of lipoma of back	2	..
Excision and skin-grafting for carbuncles of back	1	..
" of angeio-sarcoma of back	1	..
Tracheotomy and removal of foreign body from bronchus	1	..

Breast.

28 OPERATIONS.

Excision of fibro-adenoma	3	..
Incision and drainage of abscess of breast	9	..
Radical operation for carcinoma of breast	7	..
" " " recurrent-carcinoma of breast	1	..
" " " adeno-carcinoma of breast	2	..
Excision of cyst of breast	1	..
Incision and drainage for infected galactocele	1	..
Amputation of breast for tuberculosis	1	..
Excision of fibro-cyst of breast	1	..
" recurrent carcinoma of breast	1	..
" intracanallicular adenoma of breast	1	..

Abdominal Wall.

7 OPERATIONS.

Incision and drainage of abscess of abdominal wall	2	..
" " " " lumbar abscess	1	..
Excision of fibroma of abdominal wall	2	..
Incision and drainage of lumbar sinus	1	..
" " extraction of foreign body for abscess of abdominal wall due to perforation of sigmoid flexure by foreign body (toothpick)	1	..

General Abdominal Cavity.

8 OPERATIONS, 1 DEATH.

Exploratory laparotomy for multiple sarcoma of peritoneum	1	1
Resection of omentum for post-operative adhesions	2	..
Exploratory laparotomy for tuberculous peritonitis	1	..
Laparotomy and freeing of post-operative adhesions	1	..
Exploratory laparotomy for abdominal carcinomatosis	1	..
Resection of inflammatory tumor of omentum	1	..
Exploratory laparotomy for visceral crises of the erythema group	1	..

	Total.	Died.
Esophagus and Stomach.		
13 OPERATIONS, 2 DEATHS.		
External esophagotomy and extraction of foreign body (open safety-pin) from esophagus	1	..
Gastro-enterostomy for pyloric ulcer	1	..
Exploratory laparotomy for carcinoma of stomach	1	..
Gastro-enterostomy for benign stenosis of pylorus	1	..
Gastrostomy (Witzel) for carcinoma of esophagus	1	..
Resection of stomach and transverse colon for carcinoma	1	1
Dilatation of stricture of esophagus	1	..
Gastrostomy for carcinoma of esophagus (Hall)	3	..
" (Elsberg) for carcinoma of esophagus	1	..
Gastro-enterostomy for hypertrophic pyloric stenosis	1	..
" " " ulcer of stomach	1	1
Liver.		
3 OPERATIONS, 1 DEATH.		
Transpleural hepatotomy and drainage for abscess of liver	2	1
Incision and drainage for abscess of liver (amebic)	1	..
Pancreas.		
4 OPERATIONS.		
Exploratory laparotomy for acute pancreatitis	3	..
Partial extirpation and drainage of pancreatic cyst	1	..
Spleen.		
4 OPERATIONS.		
Incision and drainage for cystic tumor of spleen	1	..
Splenectomy for rupture of spleen	3	..
Gall-Bladder and Ducts.		
32 OPERATIONS, 11 DEATHS.		
Cholecystectomy and drainage for gangrenous cholecystitis and cholelithiasis	7	1
Cholecystectomy, choledochotomy and drainage for cholelithiasis	1	..
Cholecystectomy and drainage for chronic cholecystitis and cholelithiasis	2	1
Cholecystectomy and drainage for acute cholecystitis, cholelithiasis	4	1
" " choledochotomy and drainage for acute cholecystitis and cholelithiasis	1	..
" " drainage for empyema of gall-bladder and peri-		

Gall-Bladder and Ducts—*(Continued).*	Total.	Died.
cholecystic abscess	1	1
" choledochotomy and drainage for impacted stone in common duct	1	..
" choledochotomy and drainage for acute cholecystitis and cholangeitis	1	..
" and drainage for gangrenous perforative cholecystitis and lobar pneumonia	1	1
" and drainage for hydrops vesicæ fellæ with cholelithiasis and exploration of head of pancreas for carcinoma	1	1
Cholecystostomy for acute cholecystitis and cholelithiasis	3	..
" " papillary adenoma of gall-bladder and liver	1	1
" " chronic cholecystitis and cholelithiasis	2	..
Choledochotomy and drainage for impacted stone in common duct	2	2
" cholecystostomy for cholelithiasis and cholangitis	1	1
" and drainage for adhesions after cholecystectomy	1	..
Laparotomy, division of adhesions around gall-bladder	1	..
Exploratory laparotomy for persistent biliary fistula	1	1
Intestines.*		
27 OPERATIONS, 10 DEATHS.		
Ileo-sigmoidostomy for chronic intestinal obstruction	1	..
Resection of sigmoid flexure for carcinoma	1	1
" " tranverse colon for carcinoma	1	1
" " ileo-cecal junction for tumor	1	1
" " " " " " " with gangrene	1	1
Laparotomy and division of bands for intestinal obstruction	2	..
Exploratory laparotomy for sarcoma of intestine	1	..
" " " intestinal colic	1	..
Laparotomy and reduction of ileo-cecal intussusception	2	..
Resection of sigmoid flexure for recurrent volvulus	1	..
Inguinal colostomy for carcinoma of intestines	1	1
Excision of Meckel's diverticulum for intestinal obstruction	1	1
Laparotomy and drainage for perforated carcinoma of sigmoid	1	1
Enterostomy and drainage for rupture of intestine; peritonitis	2	2
Entero-colostomy for tumor of cecum	1	..
Laparotomy and division of adhesions for chronic intestinal obstruction	1	..
Appendicostomy for ulcerative colitis	2	..
Colostomy (Witzel) for ulcerative colitis	1	..
Laparotomy and division of adhesions for acute intestinal obstruction	2	..
Enterotomy and extraction of gall-stone for acute intestinal obstruction	1	..
Suture of perforated duodenal ulcer	1	..
Resection of small intestine for volvulus	1	1
Appendicitis.		
245 OPERATIONS, 14 DEATHS.		
Appendicectomy for chronic appendicitis	52	..

* See also Hernia, Rectum, Stomach.

Appendicitis—*(Continued).*	Total.	Died.
Appendicectomy and drainage for gangrenous appendicitis with abscess	50	..
" " " " acute appendicitis with abscess	17	..
" for empyema of appendix	15	..
" and drainage for acute catarrhal appendicitis	8	..
" for acute catarrhal appendicitis	31	..
" " subacute appendicitis	4	..
Enterorrhaphy for fecal fistula following appendicectomy	1	..
Appendicectomy and drainage for gangrenous appendicitis	22	1
" " " " empyema of appendix	4	..
Rectal incision for appendicitis abscess	2	..
Appendicectomy and drainage for gangrenous perforative appendicitis and diffuse sero-purulent peritonitis	15	..
Appendicectomy and drainage of cecum for gangrenous appendicitis and gangrene of cecum	2	1
Transpleural incision and drainage for subphrenic abscess following appendicitis	1	..
Appendicectomy and drainage for gangrenous perforative appendicitis and diffuse purulent peritonitis; incision and drainage for secondary pelvic abscess	1	..
Incision and drainage for appendicitis abscess	4	1
Appendicectomy and drainage for gangrenous perforative appendicitis with diffuse purulent peritonitis	13	8
Appendicectomy and drainage for gangrenous appendicitis; secondary division of post-operative adhesions (intestinal obstruction)	1	..
Appendicectomy and drainage for acute gangrenous appendicitis, with sero-purulent peritonitis; incision and drainage through rectum for secondary pelvic abscess transpleural thoracotomy and drainage for multiple abscesses of liver	1	1
Appendicectomy and drainage; counter incision and drainage and enterostomy for gangrenous appendicitis with abscess, and gangrene of wound	1	1

Hernia.

106 OPERATIONS, 7 DEATHS.

Halsted-Bassini for unilateral inguinal	31	..
" " " double "	26	..
Bassini for unilateral inguinal	2	..
" " double "	4	..
Herniotomy for congenital inguinal	3	..
" " " " and undescended testis	1	..
Halsted-Bassini for direct inguinal	2	..
Herniotomy for double direct inguinal	1	..
Halsted-Bassini for incarcerated inguinal	4	..
" " " " congenital inguinal	1	..
" " " strangulated inguinal	5	..
Herniotomy for inguinal; laparotomy for ulcerative colitis	1	1
" and resection for strangulated inguinal	1	1
" " enterostomy for inguinal, with fecal extravasation	1	1
" for femoral	2	..

Hernia—*(Continued).*	Total.	Died.
Herniotomy for strangulated femoral	2	1
Bassini for strangulated femoral	2	..
". " incarcerated "	2	..
Herniotomy for epigastric	1	..
Laparotomy for strangulated inguinal, reduced en bloc	1	1
Herniotomy for umbilical	2	..
" " " strangulated	1	..
" " ventral	6	..
" " " strangulated	2	..
" " colostomy	1	1
" and enterostomy for strangulated umbilical	1	1

Genito-Urinary Diseases.

43 OPERATIONS, 4 DEATHS.

Kidney—20.

Extirpation and drainage of multilocular cyst of kidney	1	..
Nephrotomy and drainage for pyonephrosis	2	..
Nephrectomy and ureterotomy for renal and ureteral calculi	1	..
Nephrectomy for pyonephrosis	1	1
Nephrotomy and drainage for renal calculus; gonorrheal ureteritis	1	1
Ureterotomy for ureteral calculus	3	..
Nephrotomy and drainage for ureteral calculus	2	..
Nephrectomy for suppurative nephritis	1	..
Nephrectomy and drainage for renal calculus	1	..
Incision and drainage of perinephritic abscess	1	..
Nephrotomy for unilateral hemorrhagic nephritis	2	..
Nephropexy for movable kidney	2	..
Exploration of sinus following nephrectomy	1	..
Nephrotomy for multiple kidney abscesses; renal calculi	1	1

Prostate—10.

Suprapubic prostatectomy for hypertrophied prostate	7	1
" cystostomy and secondary prostatectomy for vesical calculus and hypertrophied prostate	2	..
Suprapubic prostatectomy for malignant adenoma of prostate	1	..

Bladder—3.

Suprapubic cystotomy for vesical calculus	1	..
Circular constriction of urethra by silver wire cable for paralysis of vesical sphincter	1	..
Suprapubic cystotomy and excision of carcinoma of bladder	1	..

Penis—5.

External urethrotomy for urethral calculus	1	..

	Total.	Died.
Penis—(Continued).		
Meatotomy for stenosis of meatus	1	..
Dilatation for stenosis of urethra	1	..
Plastic for urinary fistula	2	..
Testis and Cord—5.		
Orchidectomy of tuberculous orchitis	1	..
Von Bergmann's operation for hydrocele	1	..
Orchidectomy and excision of inguinal tuberculous glands for tuberculous orchitis and adenitis	1	..
Excision for varicocele	2	..
Rectum and Anus.		
152 OPERATIONS, 1 DEATH.		
Clamp and cautery for hemorrhoids	71	..
Divulsion for fissure in ano	11	..
Incision of external hemorrhoids	2	..
Incision and drainage of fistula in ano	18	..
Excision and suture of fistula in ano	10	..
Resection of rectum for carcinoma	3	..
Excision of polyp of rectum	7	..
Ligature operation for hemorrhoids	5	..
Colostomy for carcinoma of rectum	3	1
" " stricture of rectum	1	..
Incision and suture of rectum for atresia ani (congenital)	1	..
Colostomy and dilatation for stricture of rectum	2	..
Incision and dilatation for syphilitic stricture of rectum	1	..
Plastic on sphincter ani for rectal incontinence	1	..
Colopexy for prolapse of rectum	1	..
Incision and drainage of ischio-rectal abscess	15	..
Female Genitals.		
37 OPERATIONS, 4 DEATHS.		
Pan-hysterectomy for carcinoma of uterus	1	..
Salpingo-oöphorectomy for ruptured ectopic gestation sac	1	..
Salpingo-oöphorectomy for salpingo-oöphoritis	1	..
Bilateral salpingo-oöphorectomy for bilateral salpingo-oöphoritis	1	..
Hysterectomy and drainage for tuberculosis of uterine adnexa	1	..
Abdominal hysterectomy for fibroids	2	1
Double salpingo-oöphorectomy for bilateral tubo-ovarian abscess	1	..
Curettage for angeio-sarcoma of vulva and uterus	1	1
Alexander's operation for retroversion of uterus	1	..
Bilateral salpingo-oöphorectomy for double pyosalpinx	1	..
Salpingo-oöphorectomy for pyosalpinx	2	..
Excision of epithelial carcinoma of vulva	1	..
Salpingo-oöphorectomy for dermoid cyst of ovary	2	..
Curettage for chronic endometritis	3	..

Female Genitals—*(Continued).*	Total.	Died.
Trachelorraphy for lacerated cervix	1	..
Cauterization of ulcer of bladder	3	..
Salpingo-oöphorectomy for ovarian cyst	4	..
Excision of urethral caruncle	1	..
Ventro suspension for retroverted uterus	2	..
Salpingo-oöphorectomy for ovarian cyst with twisted pedicle	2	..
Salpingo-oöphorectomy for carcinoma of ovary (cerebral embolism)	1	1
Double salpingo-oöphorectomy for bilateral suppurative salpingo-oöphoritis with diffuse suppurative peritonitis	1	..
Bilateral salpingo-oöphorectomy for bilateral ovarian cyst	1	..
Vaginal hysterectomy for fibroid uterus	1	..
Left oöphorectomy for ovarian fibroid	1	1
Lower Extremity.		
76 OPERATIONS, 5 DEATHS.		
Incision and drainage, abscess of groin	7	..
" " " " buttock	6	..
" " " " " thigh	4	..
" " " " " leg	3	..
" " " cellulitis of leg	1	..
" " " carbuncle of buttock	1	..
" " " suppurating gumma of thigh	1	..
Osteotomy and drainage, osteomyelitis, of ilium	1	..
" " " " " femur, acute	2	1
" " " " " " chronic	2	..
" iodoform wax filling	2	..
" and drainage, osteomyelitis of tibia (tuberculous meningitis	4	..
" " " " " " (tuberculous)	1	1
" " " " metatarsus	2	..
Excision, lipoma of buttock	1	..
" tumor of thigh	1	..
" internal saphenous vein, septic thrombosis	1	1
" angeioma of thigh	1	..
" metastatic carcinoma of knee	1	..
" ganglion of knee	1	..
" ulcer of knee, syphilitic	1	..
" varicose veins of leg	2	..
" angeioma of leg	1	..
" fibroma of popliteal space	1	..
" metatarsal bone for osteomyelitis	1	..
Amputation, of thigh, infected Charcot's joint	1	..
" " " gangrene of leg, arterio-sclerotic	3	..
" " " osteo-plastic, of leg, arterio-sclerotic	1	..
" " " sarcoma of leg	1	..
" " " " " femur	1	1
" " toe, Raynaud's disease	1	..
" " foot, partial, for diabetic gangrene	1	..
Resection, of knee for tuberculosis	6	..
" " hip, for osteomyelitis of femur	1	..

Lower Extremity—*(Continued).*	Total.	Died.
Resection of ankle for tuberculosis	1	..
Suturing, of fractured patella	2	..
Tenotomy, for contracture of knee	1	..
Plastic, (Krogius) for habitual dislocation of patella	1	..
Anastomosis, arterio-venous (femoral) for arterio-sclerotic gangrene of leg	1	1
Excision, inflamed ligament of knee	1	..
Removal, ingrown toe-nail	2	..
Introduction of aluminum splint (Elsberg) for fracture of femur	2	..

REPORT OF THE DEPARTMENT OF GENERAL SURGERY.

December 1, 1904, to December 1, 1906.

Report of the Second Surgical Division.

HOWARD LILIENTHAL, M.D.,

ATTENDING SURGEON.

JOSEPH WIENER, JR., M.D., CHARLES A. ELSBERG, M.D.,

ADJUNCT ATTENDING SURGEONS.

In this report of the Second Surgical Division, covering the period between December 1, 1904, and December 1, 1906, we have, as usual, kept the statistics of each year separate. In reporting individual cases we have omitted most of the less interesting successful ones, reporting the more interesting successes and practically all of the failures. We have also made it a point to report with as much completeness as possible those cases in which death *unexpectedly* followed. The catalogue of those patients who were admitted moribund or almost moribund has not been of sufficient interest or scientific value to publish here. We learn from our failures and from the unexpected deaths.

We acknowledge with much gratitude the very valuable assistance which the Department of Pathology has rendered and we appreciate the perfect system of classification and indexing of this department, which makes it a simple matter to look up the details of any case in which the services of the pathologist have ever been rendered.

Surgical methods have changed very little since the last report. In abdominal work there has been a still further abandonment of gauze packing, even of the temporary kind; for we consider the irritation and injury of the peritoneum by gauze a more serious matter than the unguarded escape of a moderate quantity of pus in a wound, which in any event is to be drained. We have repeatedly

performed appendicectomy in the presence of abscess without the use of a single packing, and it is our belief that this method has considerably diminished unwelcome post-operative adhesions.

Tuberculin is used diagnostically and therapeutically, and we are under the impression that decided improvement has occurred as a result of this treatment in certain tuberculous lesions. The dose of tuberculin should never be large enough to cause a distinct reaction, the usual dose from 1/1000 to 1/40000 of a milligram, and less in children.

The treatment of bone cavities, following operations for the various forms of osteomyelitis, with iodoform wax, as suggested by Mosetig-Moorhof, is proving favorable. The wax is often gradually extruded, but the cavity closes. At the suggestion of Dr. Wiener, in several cases of chronic empyema of the thorax, which resisted other forms of treatment, including operative, we have filled the cavity with this wax and have succeeded in curing our patients. Here, too, the wax is gradually extruded, but it seems to have a powerful stimulating effect upon the wound.

In several cases of fracture of the long bones, the intra-medullary aluminum cylinders of Elsberg have been used with much satisfaction. We believe that this form of fixation has a wide application.

Osteoplastic amputation has grown in favor and we now employ this method even in cases of angeiosclerotic gangrene.

An attempt to check this form of gangrene by arterio-venous angeiorrhaphy has been fully reported in the *Annals for Surgery* for January, 1907.

We desire to express our appreciation of the good and faithful work which has been done by our house surgeons and their assistants during the past two years. Most of the histories here reported have been abstracted by them.

The new hospital gives us more and more pleasure in our work. It seems to be so well appreciated by the public that the time is not far distant when it will be too small to meet the increased demands. It seems a pity that the work and the remarkably interesting clinical material should not be utilized for purposes of undergraduate medical instruction.

Breast.

Among the forty-six operations on the breast, including nineteen radical amputations, there was one fatal termination. The following cases are noteworthy because of the comparative rarity of some of the features they present:

Recurrent Carcinoma after Amputation of Breast. Excision; Skin Graft; Excision of Carcinomatous Supraclavicular Glands; Injury of Thoracic Duct. Death.—Esther C., aged 47, had a radical operation for carcinoma of the breast December 28, 1904, and was discharged apparently cured January 20, 1905. She returned to the hospital with small hard nodules in the line of the previous incision, April 20, 1905.

In the operation for recurrence (April 21st) the superficial tissues were widely dissected off, including with them the periosteum of the ribs, fully three inches outside the nodules on all sides. The defect left in the skin, the size of the palm of the hand, was covered by grafts. On May 15th the area was entirely covered with epithelium and the patient was discharged.

She returned May 30th, on account of recurrence of the disease in the supraclavicular region. The left arm was swollen; there were enlarged, stony-hard anterior and posterior cervical and supraclavicular nodes.

Operation May 31st. L-incision along anterior border of sternomastoid and upper border of clavicle. One inch of clavicle resected, divided ends retracted. Beginning opposite 4th cervical vertebra, fat, glands and fascia were bluntly dissected downward. At about one-half inch from junction between the subclavian and jugular veins, several small lateral tears were made in the wall of the former on account of involvement of the growth. Clamps to the vessel wall were left in situ. Exsected portion of the clavicle returned and held in place with silver wire.

After operation the temperature at no time rose above 100.4°. At the first dressing the gauze was found soaked with chylous fluid. Clamps were removed and gauze packing inserted. There was a moderate leucocytosis, normal proportions being unchanged except for the presence of 1% mast-cells. Chylous fluid continued to well up from the wound until death, which occurred June 10th as the result of a severe venous hemorrhage from the wound.

Tuberculosis of Breast. Radical Amputation. Cure.—Becky K., aged 38 years, was admitted March 4, 1905. The patient first noticed a mass in the left breast about four months before, in November, 1904.

This was followed by lancinating pain and later by the appearance of a small ulcer of the breast. The mass did not seem to the patient to have increased in size. She had lost both weight and strength.

The patient was in good general condition and fairly well nourished. The left breast showed a reddened area and small ulcer just outside the areola. The gland did not appear larger than the right, but an irregular mass was distinctly palpable in the inner and in the outer lower quadrant. There was a similar mass higher up in the outer quadrant. The tumors were rather irregular, firm and painless. Indefinite fluctuation was noted over one small area. The breast was quite freely movable. In two places there was implication of the skin. Glands were palpable in the left axilla.

On March 8th radical amputation was done. The pathological examination showed the structures removed to be tuberculous (Dr. Mandlebaum).

Convalescence was uninterrupted and the patient was discharged cured on March 25th with a granulating wound.

Tuberculous Mastitis (relapsing); Excision of Abscess. Cured. Leah B., 47 years, was admitted December 1st. She had been here two months before when an amputation of the breast had been performed. Four months before that the patient had noticed a hard mass, about the size of a hazel nut, above and to the outer side of the nipple of the right breast. Ten weeks before admission, the mass had been incised. There was a free discharge of pus. Four weeks later, patient noticed another mass below the first one. This was opened after two weeks, through the former incision. The breast however, still continued to grow larger and became more painful. There was finally a spontaneous discharge of pus with the subsidence of most of the symptoms.

On examination, the breast felt indurated. There was a small discharging sinus below the nipple. The glands in the axilla were enlarged. The temperature on admission was 98.6°, pulse 120, and respiration 28. On October 11th, an amputation of the breast was performed under gas and ether. On October 24th, although there was still a small granulating wound, the patient was discharged from the ward but told to return for observation.

She returned to the Hospital on December 1st on account of the appearance of a small nodule above and to the outer side of the scar. On the same day it was excised. Primary union occurred and the patient was discharged cured on December 5th.

Abdominal Wall.

The following two cases are quoted at length because of the great rarity of the condition. It is interesting to note that while several

years often elapse without our seeing a single case of this kind, these two cases were operated on within a few weeks of each other.

Fibroma of Rectus Abdominis; Extirpation of Fibroma. Femoral Hydrocele; Excision of Mass in Left Groin. Cure. Bessie J., aged 39, was admitted March 11, 1906. For eight months she had noticed a hard lump in epigastrium. There was epigastric discomfort after eating and considerable eructation. No actual pain, no vomiting, no loss of weight but felt weak.

Physical examination showed a hard, smooth rounded mass about the size of a lemon just to the right of umbilicus. The mass was not tender and its edges shaded off gradually into surrounding tissue. When the patient contracted recti the mass could be plainly felt to be in abdominal wall. In left inguinal region there was an elongated, fluctuating, painless swelling.

Operation on March 14th. The tumor sprang from tendinous intersection of rectus. The tumor was removed in toto with a piece of rectus and anterior sheath. Muscle and fascia were overlapped with No. 2 interrupted chromic sutures. The mass in left groin was then excised.

Pathological report showed abdominal tumor to be a fibroma and mass in left groin was vascular, fibrous and fatty tissue (Dr. Mandlebaum.) Both wounds healed by primary union and patient was discharged cured on April 1, 1906, 21 days after operation.

Fibroma of Abdominal Wall. Excision. Cure.—May McM., age 27 years, admitted January 25th, 1906. Patient was struck in abdomen two weeks before admission and on examining herself found a mass. Up to her coming to the hospital there was no change in it; she never had pain.

On examination the abdomen was found to be exceedingly adipose and a mass about six by three inches in size, wider in the middle than at the ends, was felt in the right upper quadrant. It moved with respiration.

At operation this was found to be a hard circumscribed tumor apparently springing from the posterior sheath of the rectus and pushing aside rather than infiltrating the muscle fibres. It was widely excised together with a large area of muscle tissue and several inches of peritoneum. The defect was filled in by a silver wire cable suture passed across in figure of eight fashion and no attempt was made to draw the edges together. Small rubber tube drain down to suture which was removed after 6 days. Pathological report was inflamed fibroma (Dr. Mandlebaum).

Patient continued to improve and was discharged cured February 22d.

Esophagus and Stomach.

During the past two years, from December 1, 1904 to December 1, 1906, thirty-two operations were done on the stomach, for diseases of that organ or of the esophagus, with a mortality of ten. Eighteen operations were done for malignant disease with six deaths, thirteen for benign disease with four deaths.

In making an anastamosis between stomach and intestine the posterior gastro-enterostomy of Von Hacker still yields the best results in our hands. Finney's gastro-duodenostomy we still look upon as the ideal and most physiological procedure, and it is to be hoped that with increasing experience the present somewhat high mortality will be greatly reduced.

Our experiences with the twine triangular stitch of Maury have been rather disappointing, and we have practically abandoned the method.

Carcinoma Ventriculi: Resection of Stomach and Tranverse Colon. Death.—Isaac K., aged 49 years, admitted February 12th, 1906. For five weeks before admission had cutting pain in epigastrium, which did not radiate and which was not influenced by eating. Constant belching, no vomiting. He was never jaundiced; he had lost some weight. Appetite fair; bowels constipated.

On examination the abdomen was found retracted and there was a hard, irregular nodular mass which did not seem to move with respiration, above and to the outer side of the umbilicus. Physical examination otherwise negative except for slight emphysema. Blood-counts before operation showed moderate secondary anemia. Test-meals showed absence of free H Cl, low total acidity, presence of blood and absence of Boas-Oppler bacilli. There was blood in the stools.

On February 14th Dr. Lilienthal resected about three fourths of the stomach and eight inches of transverse colon anastomosing stump and first portion of duodenum. End to end anastomosis of colon by suture. At operation the carcinoma involved anterior wall of stomach, pylorus and gastro-colic omentum and adjacent portion of transverse colon also glands in gastro-hepatic omentum which were removed en masse with the stomach.

After operation the patient's condition was good for a week. Then he complained of pain in the abdomen, vomited frequently and his pulse became rapid and weak. During the night his condition became worse and he failed to respond to stimulation. There was a rise of temperature to 101.8° and he died on February 22d, at 6.55 A.M.

Post-mortem: General purulent peritonitis (wound examination).

Carcinoma of the Esophagus and Cardia; no Operation. Died.—Alexander P., 56 years, was first admitted to the surgical service on November 23d. For the past two years patient had difficulty in swallowing. At first he was unable to swallow solid food except with difficulty and finally about ten months before admission it was impossible for him to take any solid food whatever. If he attempted to take solid food, it would go down to the lower part of the esophagus and then would be vomited. He subsisted almost entirely on milk and eggs. Even liquids he was not able to take rapidly but only in small quantities and with great effort. During the two years he lost about 50 pounds in weight.

A stomach tube was passed. This was stopped about fourteen inches from the teeth by an obstruction which could be overcome by slight pressure and then the tube passed into the stomach. When the tube was removed, small bits of tissue and blood filled the opening. Microscopical examination of the tissue showed large masses of flat epithelium but no signs of malignancy . Some of the masses of cells, however, looked like epithelial pearls (Dr. Mandlebaum).

A fairly large esophagoscopic tube was passed in 14 inches but could not be pushed inward any further. Here was seen a large irregular ulcerated mass, deeply congested and covered with flakes of fibrin. The mass bled easily. The intraesophageal pressure was increased.

The patient refused an exploratory operation and so was discharged slightly improved.

He returned to the hospital on January 30, 1906, stating that he could only swallow small quantities of fluid with great difficulty. The following day he complained of severe pain in the epigastrium. He was nauseated but could not vomit and in spite of artificial respiration and stimulation, he died that morning.

Carcinoma of Pylorus; Pyloric Obstruction; Gastro-enterostomy. Improved.—Julius L., aged 49 years, was transferred from the Medical to the Surgical service on December 14, 1904. For the past year he had been gradually losing weight and becoming weaker. No hematemesis or vomiting, but pain over upper abdomen soon after eating (within ten minutes). Had lost 18 pounds in past month.

On admission cachexia was noted. Stomach peristalsis distinctly visible at times. Stomach percussed to two fingers' breadth below the umbilicus. Right hypochondrium was tender on palpation and an indefinite mass descended on deep inspiration.

Examination of the gastric contents after test-meal showed free hydrochloric acid absent, lactic acid present; total acidity on December 5th, 140, on December 8th, 60. The guaiac test was positive and Boas-Oppler bacilli were present.

Blood examination showed hemoglobin 30%; color index ¾; white blood cells 17,000; normoblasts were seen.

On December 14th, 1904, posterior gastro-enterostomy by Maury's method was performed.

Convalescence was uninterrupted and he was discharged on January 6, 1905, improved.

Gastric Carcinoma; Gastrectomy; Posterior Gastro-enterostomy Maury's Double Triangular Suture. Death.—James H., aged 59, was admitted February 13, 1905. For eight months before admission the patient had suffered from the symptoms of a gradually growing carcinoma involving the pyloric end of the stomach. During this time he had lost much flesh and strength.

On admission the stomach was found much dilated; about three quarts of coffee-colored material were removed by stomach tube. A test-meal showed absence of free hydrochloric acid, presence of much lactic acid, Boas-Oppler bacilli, muscle fibers and red blood cells.

On February 17th, wide resection was performed, the pylorus and the pyloric half of the stomach being removed; wound of the stomach closed with several layers of silk sutures. Purse string silk suture and transfixion ligature placed about duodenal end and stump cauterized with pure carbolic acid. A posterior gastro-enterostomy was now performed by Maury's suture. Abdominal wound was closed and cigarette drain left to duodenal stump.

After operation the patient's condition gradually grew worse, the pulse became more rapid and feeble and the temperature gradually rose. The patient vomited fluid containing blood. On February 20th he became delirious, his pulse very rapid and feeble, tongue dry and coated. He looked septic and his temperature rose to 102.4.° On February 21st the temperature kept on rising, the pulse became still more rapid and feeble; the patient continued delirious, muscle twitching set in and in the evening he died.

Post-mortem examination through wound showed general purulent peritonitis. Maury's suture had only partially cut through. Gastrectomy wound was well closed excepting at one point where the suture line had given way and at this point there was an opening directly into the peritoneal cavity. (Dr. Buerger.)

Stenosis of Pylorus. Gastroptosis. Finney's Gastro-duodenostomy. Death.—Marcus H., aged 47, was admitted November 9, 1904. For about one year before admission had had marked constipation; for six months before had had anorexia, heartburn, epigastric pain and belching of gas after meals. For three months before had vomited daily about 15 minutes after eating. Vomitus frequently had contained mucus but no blood. Epigastric pain had come one to two hours after eating. During the past six months had lost twenty to thirty pounds.

On admission stomach percussed halfway between umbilicus and symphisis.

On November 10th test meal given and six ounces withdrawn. There was present more than normal amount of free hydrochlorie acid; no blood or any other pathologieal element found. Till December 21st patient had been treated with alkaline fluid and daily lavage, with no improvement.

On Deeember 21st a gastro-duodenostomy (Finney) was performed; the round ligament was also sutured for hepatoptosis. On December 22d, twenty-two hours after the operation the patient went into collapse and died.

On post-mortem examination by Dr. Libman the stomach, duodenum and a considerable part of the jejunum were found to be filled with blood. There had been *no* vomiting and there was no indication that hemorrhage was oceurring until it was too late for surgical aid. From this and other cases we conclude that vomiting is not likely to occur after Finney's operation and as a symptom its absence must be disregarded.

Pyloric Stenosis; Periduodenal Abscess; Gastro-enterostomy by Maury's Suture. Death.—David F., aged 55 years, was admitted March 7, 1905. For two months previously he had felt sticking pains in the left and right hypochondriac regions. Shortly before admission these pains had made their appearance two or three hours after eating. He had vomited only once or twice. There was no blood in the vomitus nor in any stool passed. Eructations of gas gave relief. He had lost both weight and strength.

On admission the general condition was good. There was some tenderness in the epigastrium on palpation and a vague sense of resistance, which was later distinctly felt to be a mass, hard and freely movable, running into the right hypochondrium.

Repeated test meals showed free hydrochloric acid present in normal and in exeessive amounts. Lactic acid was absent.

On March 22d posterior gastro-enterostomy (Maury's suture) was done. On opening the abdomen the thickened, stenosed pylorus was found drawn up beneath the liver, making external palpation impossible. The gastro-enterostomy was done without great difficulty. The patient reacted rather poorly. There were uremic symptoms for a few days after operation, but these subsided and on March 27th there seemed to be distinct improvement. The patient then began to fail, however, and died on March 29th.

Autopsy showed the pylorus to be enclosed in a large abscess cavity, which seemed to have originated from an old ulcer. It was walled off from the general abdominal cavity. The Maury suture had not cut through by this time (8th day after operation).

Stricture of Pylorus. Gastro-enterostomy (Maury's Suture). Cure.—Jacob C., aged 33, was admitted February 22d, 1905. Five months before admission he had begun to suffer with sharp pains in the right hypochondrium, which had become progressively severer. He had been in bed for the previous three weeks, vomiting frequently. On admission the general condition was good. Nothing abnormal was palpable in the abdomen.

Gastro-enterostomy by Maury's suture was done on February 24th. On opening the abdomen the whole pyloric region was found bound down by adhesions. These were separated as widely as possible, so that when freed, the pylorus admitted the tip of the finger through the invaginated stomach. The mass was felt to be in the wall of the pylorus. The pylorus being patent the case was considered suitable for gastro-enterostomy with delayed formation of stoma and Maury's method was selected. The operation was performed without difficulty and the patient reacted well. A few attacks of pain returned, but they soon ceased and convalescence was practically uninterrupted. The silk triangular ligature was recovered in the stools on March 8th (13 days after operation) considerably digested. The patient was discharged cured on March 13th.

Pyloric Ulcer; Gastro-enterostomy; exploratory laparotomy; Cure.—Max Steier, age 40; admitted February 5th, 1906. During two years before admission the patient had four attacks, lasting from 2 to 3 weeks, of cramplike pain in right hypochondrium, radiating at times to back, shoulder or opposite side; vomiting and eruption of gas. Vomiting was usually about two hours after eating and never coffee-ground or bloody. Never was jaundiced; never passed gallstones. Bowels always constipated; never passed blood per rectum.

Physical examination showed tenderness and rigidity of upper half of right rectus and an indistinct mass in right flank. Clapottage could be elicited. There was a secondary anemia. Red blood cells 2,710,000; hemoglobin 35. Examination of vomitus showed presence of free hydrochloric acid, absence of lactic acid and Boas-Oppler bacilli.

On February 9th preliminary gastro-enterostomy for tumor of pylorus was done. Patient did well after operation and was fed peptonized milk 48 hours after being operated upon. On March 2d the original incision was reopened and tumor mass at pylorus was found to have completely disappeared. It was therefore decided that there probably had been an inflammatory mass around an ulcer rather than a carcinoma. Nothing further was done and abdominal wall was closed. Wound healed with primary union; patient's weight increased from 98 pounds on admission to 106 pounds and he was discharged cured March 21st.

On February 27th patient received 50 c.c. nucleinic acid. Leucocyte and differential counts before and after injections were the same.

Liver.

During the past two years nine operations were done on the liver, with four deaths. Two exploratory operations for tumor of the liver were performed, and in the one an inoperable carcinoma, and in the other a sarcoma was found.

Six patients with abscess of the liver were operated upon with four recoveries. Of the two fatal cases, in one there were multiple abscesses, the other was a single abscess. This bears out our past experiences that while a large proportion of patients with single abscesses of the liver can be saved by surgery, the condition of multiple abscesses invariably goes on to a fatal termination.

Abscess of Liver; Transpleural Thoracotomy and Hepatotomy. Cure.—Israel B., aged 13 years, was admitted November 6th, 1904. About the second week in October (four weeks before admission) he had begun to suffer with headache, loss of appetite, chilliness and irregular fever and pain, at first in abdomen but later in right hypochondrium and shoulder. It was never severe in character.

On admission the patient was poorly nourished. Over the lower right lung posteriorly was marked resistance on percussion and dulness with no other signs. Anteriorly the liver dulness extended to the level of the umbilicus. There was tenderness on palpation in the right hypochondrium.

On November 7th exploratory puncture was done. The needle was inserted into the tenth space below the angle of the scapula. Nothing was obtained from the pleural cavity, but on deep aspiration about 3 c.c. of yellowish mucoid material was drawn out, and reported to contain streptococci and staphylococci. There were no amebæ or liver cells (Dr. Bernstein).

On November 8th the 10th rib was resected, the pleura opened and the edges sutured to the diaphragm. An aspirating needle was inserted downward and pus obtained. Incision was then made and one-pint of yellowish pus evacuated. Drainage was instituted. Leucin and tyrosin were found in the urine on the day of operation. The patient's condition began to improve at once. Discharge, at times bile stained, continued for several weeks. The sinus became quite small but the discharge continued and it was found necessary to resect a small portion from each end of the resected rib. The sinus promptly closed and the patient was discharged cured on January 27th with a superficial granulating wound.

Amebic abscess of liver; incision and drainage; cured.—Max J., aged 32, carpenter; admitted July 6, 1906. Had always been well until one year previous to admission. Since that time had constant pain in epigastrium and back; for four weeks had first noticed a swelling in epigastrium; had lost twelve pounds in weight; pain not influenced by taking of food; never vomited. On examination there was found a bulging mass the size of a large grape-fruit in the epigastrium; it was firm, slightly movable from side to side, moved in the respiration, edge sharp, surface smooth and regular, not tender. W. B. C., 16,200, polynuclears 82%, eosinophiles 35%.

On July 11th an incision was made between the fibres of the right rectus and the mass was found to be a large encysted abscess arising from the under surface and left lobe of liver; it was incised, a large quantity of odorless chocolate-brown fluid and yellowish pus evacuated, and a large rubber drainage tube inserted into abscess cavity.

Pathological report of pus (Dr. Ryttenberg): amebæ and staphylococcus aureus. The patient made an uninterrupted recovery and was discharged cured August 4th.

Abscess of Liver; transpleural thoracotomy and hepatotomy; death.—Edward J., aged 31, was admitted May 14, 1906. Patient had been operated upon for recurrent appendicitis at his home three weeks previously. Wound healed kindly, but patient complained of dragging pains in right hypochondrium had several chills followed by fever and marked weakness. There was tenderness in right side in liver region.

On the day of admission a vertical incision was made in right anterior axillary line; seventh and eighth ribs resected; pleura aspirated and bloody fluid obtained. A mass was felt below diaphragm; this was aspirated and bloody purulent fluid obtained. After suture of pleura abscess was evacuated; abscess cavity packed.

Temperature came down after operation, but two days later rose to 105.8°, and in spite of free drainage remained high. The patient's condition steadily grew worse and he died on May 21st.

Hepatic Syphilis; New Growth; Erysipelas. Death.—R. D., aet. 24, married, had been in the hospital before, from August 10th to August 14th, 1905. Her history was that she had always been well until she married, at the age of 15. Her first two pregnancies had resulted in miscarriages, one at seven months, the second at two months; since then she had not been pregnant. Menstruation had always been scanty, but ceased six months before admission. A year and a half before there was an attack of diarrhea with fever, and the patient was operated on, an incision being made in the left lumbar region. This discharged thin pus freely and has never permanently closed. One year before admission there was another severe

attack of diarrhea and fever, lasting two weeks. The abdomen began to swell, and six months before admission the patient was tapped, serous fluid being withdrawn.

On admission, August 10th, the general condition was fair. There was a deep sinus in the middle of a left-sided nephrotomy incision, which discharged a thick yellowish pus. There was no fluid in the abdomen. The liver edge was palpable at the level of the umbilicus, and was firm, irregular not nodular. The temperature ranged between 100° and 104°; the pulse 110. Patient left the hospital in four days unimproved.

The patient was re-admitted October 28th, 1905, with the history that, since leaving the hospital, there had been no improvement. The abdomen had begun to swell in September.

On re-admission, the general condition was poor, the patient looked emaciated. There were signs of a moderate amount of fluid in the right chest. The heart showed a compensated mitral stenosis. The abdomen was full of fluid. The lumbar sinus was discharging pus freely. Temperature was normal. W. B. C. 18400; differential was normal.

The abdomen was tapped October 30th, a large amount of opalescent serum being removed. The examination of the fluid in spreads and cultures was negative. After paracentesis the liver edge was palpable two fingers below the level of the umbilicus, hard and irregular. Over the surface of the liver there were several large, hard nodules which could be grasped through the abdominal wall. Examination of the discharge from the sinus and of the feces was negative. The patient was placed on vigorous mixed treatment. By November 18th, there was a distinct and decided change. She looked much better. Though the abdominal fluid had collected within twenty-four hours after the early paracenteses (October 30, November 2d, November 6th), after the tapping on November 15th, only a little fluid had collected in three days. An even more striking change was in the liver. On November 18th, the edge was a full inch above the level of the umbilicus; the nodules had disappeared, only gentle irregularities on the liver surface being present where the nodules had been. The temperature which had been in the first ten days between 100° and 101°, dropped to 98.7 to 100°. The patient continued to improve in this manner to November 22d, when erysipelas developed about the lumbar sinus, with high fever and a rapid pulse. The patient sank rapidly, and died two days later.

No post-mortem.

Work on the diseases of the biliary system has been continued actively during the past two years. The principal change in technique

has been the more frequent employment of drainage of the ducts even in the non-septic cases.

The number of cases complicated by jaundice has been quite large and the percentage of death has once more proven that radical operations undertaken in the presence of icterus are extremely dangerous. We intend in future to perform these operations in two stages—the first for the relief of the jaundice, the second for the removal of the obstruction. Since the simplest operation for drainage is cholecystostomy, we intend, whenever possible, to make this our first step, reserving the complete operation in one sitting for such cases as are accompanied by an atrophic gall-bladder empty of bile. At the primary cholecystostomy we intend to take every precaution to avoid the formation of unnecessary adhesions which might complicate the subsequent work.

When choledochotomy is performed at the primary operation, the work is rendered much easier by freeing the thickened gall-bladder and using this organ or the stump of its duct as a retractor for drawing the choledochus into view. When the stump of the cystic duct is thus used the usual traction sutures are inserted as aids.

Cholecystectomy as a primary procedure in cases uncomplicated by jaundice is still considered a safe procedure and its results are, on the whole, satisfactory.

From 1900 to 1906 we have performed cholecystectomy for cholelithiasis or complicating cholecystitis without jaundice, perforation or gangrene, 68 times with 2 deaths—2.9 per cent. The same operation in cases complicated by jaundice, gangrene and perforation was performed 61 times with 19 deaths—31 per cent. We feel quite certain that this death-rate can be considerably reduced by preliminary drainage as has been suggested.

Cholecystostomy for drainage has apparently cured acute pancreatitis, while this operation in jaundice due to carcinoma of the head of the pancreas, has not usually appeared to prolong life.

When the gall-bladder has been removed for stone without complicating acute inflammation, and careful exploration has assured us that the ducts are absolutely free, drainage is best through the natural channels into the intestine and the opening in the bile duct may be sutured.

Acute pancreatitis; sero-sanguineous peritonitis; cholelithiasis; exploratory laparotomy; cholecystotomy and drainage; cured.—Minnie H., married, aet. 22, three weeks before admission and six weeks before the birth of her first child, had an attack of epigastric pain and vomiting which subsided in a few hours. Since then felt well till the day before admission when she was seized with a sharp pain in the right hypochondrium, radiating downward. Vomited

twice, once bile-stained. Bowels normal; no jaundice. Later the pain radiated all over the abdomen but was most marked in the epigastric and right hypochondriac regions.

On admission, May 26, 1905, abdomen markedly distended and rigid, so that deep palpation was impossible. Marked tenderness in the epigastrium as well as in both iliac fossæ. Vaginal and rectal examinations negative. Under anesthesia a mass was palpable in the epigastrium. Temperature 101.8; pulse 120; respiration 28.

The impression made was that of an individual suffering from perforation of one of the viscera, with peritonitis. The easily palpable epigastric mass led us to believe that we were dealing with a case of perforated gastric ulcer with considerable effused lymph and probably adhesions with neighboring viscera.

Operation. Median incision above umbilicus. On opening peritoneum bloody fluid escaped. Fat of omentum and parietal peritoneum showed many areas characteristic of necrosis; to a less extent the subcutaneous fat. Pancreas enlarged and hard, especially the head. Median incision closed. Right rectus incision made for the gall-bladder. Aspiration of the pancreas through this opening was negative. Peritoneum of gall-bladder sewn to parietal peritoneum. Purse-string suture about the gall-bladder. On incision much bile-stained mucus escaped and many small granular stones as well as two larger (pea-sized) ones. Tube drainage of gall-bladder.

The post-operative progress of the patient was uneventful. There were occasional complaints of sharp pains in the abdomen. Temperature ranged for the first week between 100° and 102°. Pulse between 85 and 110. Discharge of bile copious for the first two weeks. Patient discharged cured June 27th with a small superficial sinus.

Microscopic examination of omental fat removed at operation showed fat necrosis (Dr. Mandlebaum). The material draining from the gall-bladder was examined for trypsin, steapsin and pancreatic rennet with negative results. Examination of stools was negative for blood; positive for bile and free fat.

This patient was seen October 22, 1905, and appeared to be in normal health. The abdomen was somewhat distended by gas in the intestines but there were no symptoms of disturbed digestion. The cicatrix was small and firm.

The interesting point here was the epigastric mass. We have noted this sign in other cases of acute pancreatitis, the mass being the enormously enlarged head of the pancreas felt through the stomach walls or in the epigastrium above the stomach as was the case here.

Gangrenous cholecystitis; acute pancreatitis with fat necrosis; cholecystectomy and drainage; death.—Mrs. L. R., aet. 38, had had

typhoid at the age of 13; otherwise she had always been well. No history of an attack of abdominal pain.

Present illness: About twenty hours before admission to the hospital there was a sudden onset of vomiting without known cause. Soon after sharp, abdominal cramp-pains in the epigastrium set in. Vomiting was repeated 8 or 9 times, greenish-yellow in color. The pains persisted. Bowels did not move with cathartics and enemata. Abdomen became markedly distended.

On admission, October 29, 1905, the patient had an anxious expression, respirations 36; pulse small, 116; temperature 98.8°. Patient was well nourished; no icterus. The heart was moderately enlarged, a systolic murmur heard at the apex and transmitted upward. Upper border of the liver percussed normally. Abdomen markedly distended and prominent. Reducible umbilical omental hernia the size of an egg. Considerable rigidity of both recti; movable dulness in both flanks. In the gall-bladder region there was decided resistance and an indistinct mass was felt. Abdomen very tender everywhere.

The patient was given a series of effectual high ox-gall enemata, and the distention became less marked, rigidity and tenesmus diminished, and became localized to the right hypochondrium. An icteroid tint of the skin developed; there was bile in the urine; stools normal in color. The temperature was between 100° and 101.60°, pulse 100, leucocyte count normal. Because the patient seemed to be getting progressively worse, operation was decided on.

Operation November 2d, 1905. Right rectus incision as for the gall-bladder. When peritoneum was incised dark-brown fluid escaped. The omentum in the region of the gall-bladder was dotted with areas of yellowish-white fat necrosis, the areas varying in size from a pin-point to a quarter-dollar. The peritoneum overlying the gall-bladder was stripped back, the gall-bladder shelled out, two tension sutures placed in the cystic duct, the gall-bladder clamped off and removed. A cigarette drain was sewn to the stump of the cystic duct. Abdomen sewn up in layers. The gall-bladder was normal in size but the walls were greatly thickened; it contained no stones. Its contents were a thick viscid bile. The specimen showed acute submucous inflammation with various sized areas of gangrene seen from the outside. There was fat-necrosis in the peritoneum of the gall-bladder.

Post-operatively the patient did not do well although there was no increase in the pulse rate or symptoms pointing to peritonitis. Towards the end the pulse became slow and irregular, respirations accelerated. Patient died on the second day after operation.

The gall-bladder was reported acute submucous inflammation. Cultures from peritoneal fluid sterile. The specimen of fat removed at operation reported fat-necrosis and acute inflammation (Mandlebaum).

Post-mortem. No peritonitis. A little dark-colored grit in the

common bile duct. The pancreas showed interstitial pancreatitis with small areas of necrosis; the islands were involved. The omentum in the region of the gall-bladder showed fat-necrosis and hemorrhages (Dr. Libman).

The gall-bladder was removed in this case because of the gangrene. Drainage of the biliary passages might have had a good result here but there are many surgeons who do not regard this step as the important one in the cure of pancreatitis, believing that the removal of the toxic fluid from the peritoneal cavity determines the cure. We believe that as a rule biliary drainage should be carried out whenever laparotomy for pancreatitis is undertaken.

Gangrenous cholecystitis; cholelithiasis; cholecystectomy; cured.—Lena S., 44 years, was admitted November 16, 1905. For four days she had been suffering with sharp colic-like pains in the epigastrium radiating backward. The next day the pain was referred to right iliac region and became more severe. She had vomited many times, her bowels were constipated and she had headaches. There was no jaundice or chills. Stools, urine and vomitus were free from blood. On physical examination there was a great deal of resistance in right hypochondrium and a palpable mass could be felt extending to the umbilicus. Blood count, 23,000 leucocytes, the differential showing 91% of polynuclears. Cholecystectomy with drainage to the stump was performed on November 17th. A large gall-bladder was found with numerous gangrenous areas. The patient was discharged cured on January 13th. There was still a small discharging sinus which subsequently healed.

Gangrenous cholecystitis; cholelithiasis; cholecystectomy; edema of lungs; death.—M. G., male, aet. 80 years, admitted August 30, 1905. Eight days prior to admission the patient had been seized with vomiting and severe non-radiating pain just below the right costal margin. There was no chill but some fever. The bowels moved but the stools were not clay-colored. The patient's general condition was poor. There were some dry crepitant rales at bases of both lungs. Arteriosclerosis was marked. The liver extended to the level of the umbilicus. There were marked rigidity and tenderness in the lower right chest and upper right quadrant of abdomen with marked resistance of right costal arch. The abdomen was distended and too rigid for palpation. A Head's zone in the eighth right dorsal segment was present. On admission the temperature was 100.6° F., pulse 110; respiration 28. There was albuminuria with hyalo-granular casts and no bile.

On August 31st, under chloroform anesthesia, a 4-inch incision was made through the upper right rectus. The gall-bladder was found enormously enlarged and covered with gangrenous omentum. This was separated by blunt dissection and removed. During manipulation

of the gall-bladder the friable cystic duct tore; a clamp was applied and allowed to remain in situ. The removal of the gall-bladder was followed by the escape of foul-smelling pus, the general peritoneal cavity having previously been walled off. Gauze drains inserted to stump of cystic duct and abdominal wall closed with through and through chronic sutures. The gall-bladder was 5 inches long and its walls enormously thickened, inflamed and hemorrhagic; mucosa thickened. The gall-bladder contained 15 faceted calculi of various sizes and thick, foul muco-pus. A culture from this showed bacterium coli. (Reported by Dr. Hays.)

The patient reacted rather poorly. The day following operation his general condition was worse, edema of the lungs set in and he died.

Gangrenous cholecystitis; cholecystectomy and drainage; cured.—Mrs. R. F., 54 years, was admitted on September 20th. About one week before, the patient had a chill with temperature of 105° and pain in the right upper quadrant of the abdomen. The pain grew steadily worse. There was some nausea but no vomiting. The bowels were constipated. Physical examination showed some tenderness in the right hypochondrium. Right rectus was somewhat rigid. On September 21st, cholecystectomy and drainage was performed. All the gall-bladder, excepting one inch, was removed. A rubber tube was inserted into the cystic duct where a small stone had been found and removed. The gall-bladder showed gangrene of the entire mucosa. A sinus formed after the operation but this healed entirely and the patient was discharged cured on December 3d.

Gangrenous cholecystitis with gall stones; cholecystectomy and drainage; death.—Jacob G., 47 years old, was admitted July 12, 1906. First symptoms of biliary trouble seven months before admission. The attack lasted 2 days and was followed by slight jaundice. Another attack four weeks before admission, and twenty-three days later, or five days before admission, a severe attack occurred which seemed to be relieved by catharsis but which recurred in 48 hours and was then accompanied by fever and vomiting, with slight jaundice.

On admission liver was found much enlarged and an oval tender mass was palpable in right hypochondrium. Right rectus was rigid in its upper portion.

July 18th. Cholecystectomy with drainage of cystic duct. Gall-bladder was enlarged, its walls thickened and at one point gangrenous. Numerous dark stones were present.

There was considerable post-operative vomiting and later persistent hiccough. Five days after operation the wound was dressed. Very little discharge. Symptoms unrelieved and death occurred on August 1st, 13 days after operation.

A limited autopsy through the wound showed great distention of the colon. Everything about the wound was in good order. Healed tuberculosis at apices and miliary tubercles at both bases (Dr. Libman).

Acute gangrenous cholecystitis; cholelithiasis; cholecystectomy and drainage; cure.—Ida S., age 35, admitted February 24, 1906. One week before admission suffered sudden, acute, general abdominal pain, most marked in right hypochondrium and radiating to right shoulder. Vomited once and had a slight chill and some fever. Bowels were constipated. She was not jaundiced. Patient had suffered a similar attack about a year before.

On examination liver was palpable two fingers below free border and was tender; a rounded tender mass could be felt below it. There was tenderness and rigidity of right upper half of rectus and movable dulness in flanks.

On February 25th cholecystectomy was performed. Gall-bladder was aspirated and muco-purulent fluid withdrawn. Two stones about ¾ inch in diameter were removed, one from gall-bladder and the other from cystic duct. Gall-bladder amputated and rubber tube placed in the stump. Drains to bed of gall-bladder and around tube.

Bacteriological examination of pus showed presence of Friedlander's bacillus (Dr. Kessel).

Wound healed normally and patient was discharged cured March 31st, a small superficial sinus remaining.

Cholelithiasis; gangrenous cholecystitis; cholecystectomy and drainage of the cystic duct; cure.—Mrs. P., family history negative. About three years before admission was operated upon for ischiorectal abscess; no sequelæ. About five months before admission, patient began having vague epigastric pains following meals; no cramps; no nausea or vomiting.

Present illness: Three weeks before admission, patient suffered sharp pains in the right hypochondrium with vomiting. Vomiting seemed to relieve the pain. This type of attack recurred every three of four days. Stools became light-colored; urine irritating; jaundice was not noted. No chills. Patient abed for three days before admission. Urine contained no bile.

Operation October 18, 1905, day of admission. Four inch right rectus incision. Gall-bladder small, tense, full of soft stones and thick bile. Gall-bladder incised and its contents evacuated, the general cavity being first packed off. Gall-bladder was then dissected out. Cystic artery tied off separately. A rubber tube sewn into the stump of the cystic duct after the gall-bladder had been clamped and removed; three guide sutures to the stump. Because of absolute absence of jaundice in the patient's history and at the time of operation, the

common duct was not explored. Rubber dam was placed against the raw surface of the liver. Layer suture of the abdominal wall.

Post-operatively, the temperature which had been 102.4° on admission dropped on the third day to normal, with a corresponding drop in the pulse. On the sixth day the rubber dam was removed. On the ninth day the rubber tube was removed and replaced by a similar one. On the tenth day very little discharge and no drainage used. Patient left the hospital on the twenty-third day, healed.

Papillary adenoma of gall-bladder and liver; cholecystostomy; death.—Joseph H., aged 38, admitted for the first time December 21, 1905. Ten months before admission was suddenly seized with cramp-like pains localized to umbilical region. Since then has had attacks at intervals of a few days, lasting for several hours, and pains which radiate occasionally to back and right shoulder. No vomiting or fever during attacks. Marked constipation and clay-colored stools but no jaundice until a week before admission.

There is some tenderness to right of umbilicus, well-marked rigidity of upper half of right rectus but no mass to be felt.

The diagnosis of cholecystitis was made but patient refused operation and left hospital to return in seven weeks (February 11th) with increased jaundice and a smooth, tense, somewhat tender mass with lower border distinctly rounded, occupying greater part of right side of abdomen almost to Poupart's ligament. Test-meal normal. Blood showed moderate secondary anemia and an increase in polymorphonuclear neutrophiles.

Cholecystostomy on February 14th. A basinful of thick, grumous, brownish-red material evacuated.

Eight days after operation temperature rose to 105.° patient developed signs of right lower lobe pneumonia and died on February 26th with pulmonary edema.

Post-mortem: Partial autopsy showed a new growth of gall-bladder with metastases in liver (Dr. Libman).

Impacted biliary gravel in the common duct; choledocotomy and drainage; died.—Mrs. Clara F., 31 years, was admitted to the hospital on December 27, 1905. Her gall-bladder had been extirpated on February 28, 1903 for cholecystitis and obstructive jaundice, a choledochotomy being done at the same time and a calculus removed. Drainage for about 6 weeks. Since operation, she had suffered from intermittent attacks of biliary colic. Her jaundice had occurred soon after discharge and usually deepened during and after her attacks. At these times the stools were clay-colored. On December 29th, a choledochotomy was performed. A great deal of gravel, about 12 grammes, was removed. The temperature remained elevated and the jaundice persisted. On January 11th, because of the presence of a hematoma

in the abdominal wall, an incision was made under cocaine and a half a pint of bloody fluid escaped from the peritoneum. The patient became weaker and weaker and finally died on January 18, 1906.

Cholelithiasis; cholecystectomy; cure.—Sarah U., age 37 years, admitted February 6, 1906. For two years had attacks of pain in epigastrium extending to right hypochondrium and right shoulder, lasting from 15 minutes to two hours and followed by belching of gas and passage of flatus. During the six months before admission the attacks became more frequent, every two or three weeks. She never noticed any jaundiced or clay-colored stools. Urine never was red. She never vomited. Bowels were usually constipated.

Physical examination was negative. Gastric analysis and leucocyte counts were normal.

On February 9th cholecystectomy was done. Gall-bladder was found enlarged and filled with many small faceted stones. It was neither thickened nor inflamed. After amputation a stricture of cystic duct was found. Common duct normal to palpation.

After operation there was much vomiting, some flagging of pulse, distention and acetonuria. After first week gradual improvement and patient was discharged cured March 11th.

Cholelithiasis and cholangeitis; cholecystotomy and choledochotomy; died.—Joseph S., 66 years, was transferred from the Medical service on December 24th. He had first been admitted to the Medical service on November 21, 1906, with a diagnosis of gastro-duodenitis. A year before he had had fluttering pain over the right lower ribs, the diagnosis being made of dry pleurisy. Three months later he had an attack of pressing pain over the sternum which radiated to the back and umbilicus. The pain lasted several hours and terminated in vomiting. He had a chill at that time. He was free until one month before admission when he had another attack and a final attack three days before he was admitted. Preceding the attacks there was nocturnal urination with cutting pain. The bowels were constipated. Conjunctival icterus and itching of the skin began three months ago.

On admission there was slight icterus of the skin and conjunctiva. Physical examination was negative. Urine showed a trace of albumin, hyaline and granular casts. WBC, 12,800, polynuclears, 71%. On November 23d, patient had a chill, his temperature rose to 101°. Later he had a second chill, temperature 103.4°. The temperature went down to normal the following day. During the time he was on the medical service, he had five sudden rises of temperature between 100° and 102°. The W. B. C. remained low and the jaundice diminished.

Patient was admitted again on December 24th. He had been well until three days before. He urinated five or six times that night, noticing that the urine was very dark. He had pressing pain over

the sternum. The next day he had a chill. At time of admission he had no jaundice, had pre-sternal pain, chilly sensations, malaise and pain in the left shoulder.

Physical examination—conjunctiva icteric. Skin showed slight jaundice. Otherwise negative.

On December 30th, the jaundice had greatly diminished. On the following day, the temperature rose to 103.8° and the jaundice increased. On January 4th, slight resistance was felt in the epigastrium. The following day the temperature rose to 105.6°. W. B. C., 20,400. On January 7th the temperature came down to normal and the jaundice almost entirely subsided. The urine showed no albumin, a few hyaline casts. Bile positive.

On January 10th, the patient was transferred to the Surgical service, where a cholecystotomy and choledochotomy were performed under gas and ether. The gall-bladder was bound down by adhesions to the hepatic flexure of the colon and on careful dissection, a communication was found between the two. Several small stones were removed from the gall-bladder. A large stone was found at the upper portion of the common duct and another was found impacted in the Papilla of Vater. Both of these were removed. Although a probe passed up easily into the hepatic duct, no flow of bile could be obtained from above. A large rubber tube was fastened into the common duct.

At the time of operation the temperature was 98°, pulse 112 and respirations 26. The temperature began to rise, pulse rose to 150 and respirations to 36. Stimulants were given continuously but the patient would not respond. The tube in the common duct would not drain well and in spite of constant stimulation the patient died on January 11th.

Autopsy.—Peritoneal cavity contained small amount of thick, greenish fluid. Some leakage around tube in common duct. Large intestine thorax fistulous tract communicating with gall-bladder. Kidneys showed marked nephritis (Dr. Libman).

Cholelithiasis; cholecystectomy; no drainage of ducts; cure.—Mrs. Maud S., aged 29 years, was admitted May 7, 1905. Five years previously the patient had had a very severe attack of biliary colic; two years later another had occurred. For six months before admission the attacks had been very severe. She had never been jaundiced but was at times nauseated.

On May 8th cholecystectomy was performed. The liver and gall-bladder were both found slightly enlarged. The gall-bladder was kinked at right angles to the cystic duct. The viscus was removed by ablation above a ligature. A cigarette drain was inserted to the stump of the cystic duct and a packing placed into the bed of the gall-bladder.

On May 13th the drain and packings were removed and a small tube and gauze drain introduced. There was then slight serous discharge. The drains were entirely removed on May 18th and the patient was discharged cured on May 21st, 13 days after the operation.

Cholelithiasis; biliary fistula; secondary cholecystectomy; cure.—Becky G., aged 31 years, was admitted February 8, 1905. On July 30, 1904, seven months previous, cholecystotomy had been done for acute cholecystitis and cholelithiasis. The discharge persisted, requiring daily dressings. Pain of a burning character had been felt over the sinus. The patient had not been jaundiced since operation; the stools had been brown and the urination normal.

On admission a linear scar about 3½ inches long was noted in the right hypochondriac region; near its center was the mouth of a sinus into which a probe could be passed for 6 inches. Clear yellow fluid could be expressed.

Secondary cholecystectomy was performed on February 10, 1905. Adhesions made the operation somewhat difficult but the gall-bladder was removed entire. A drainage tube with small gauze packing was carried down to the stump.

The pathological report by Dr. Mandlebaum was "chronic inflammatory". After operation the patient rested fairly well. Convalescence was uninterrupted and she was discharged cured on March 18th.

Cholecystitis; cholelithiasis; obstructive jaundice; cholecystectomy and drainage of common duct; cure.—Laura B., aged 29 years, admitted January 16, 1906. Three days before admission the patient experienced colicky pains in abdomen, became jaundiced and had some fever. She found no stones in her stool. She had had several similar attacks before.

At operation a small contracted gall-bladder, bound down by numerous adhesions, was found. A nodular stone the size of a marble was extracted and the gall-bladder amputated at junction of cystic and common ducts, after patency of the latter had been assured. Small rubber tube sutured into stump of cystic duct.

Two weeks after operation tube was removed and 12 days later, February 12th, patient discharged cured without jaundice and with stools yellow. Drainage kept up for some weeks.

Acute cholecystitis; cholelithiasis; cholecystectomy and drainage; cure.—Anna R., aged 45, was admitted March 5, 1906. For many years before admission she had from time to time attacks of pain in right hypochondrium, which pain usually radiated toward epigastrium, but occasionally to right arm and back. Some of the attacks were accompanied by chill, fever or vomiting. No jaundice or clay-colored stools. For three days before admission the patient

had severe pain in right hypochondrium, which radiated to epigastrium, back and right arm; had chills and fever and vomited several times; jaundice doubtful.

On day of admission (March 5th) a cholecystectomy was performed after a preliminary aspiration (of about 6 ounces of purulent fluid) with Dr. Lilienthal's instrument. The gall-bladder was about 6 times normal size and contained many stones of varying sizes; cystic duct also contained a large stone. The pus contained bacillus mucosus capsulatus (Dr. Fried). The patient made an uninterrupted recovery and was discharged cured on April 12th, 38 days after operation.

Acute cholecystitis and cholelithiasis; diabetes mellitus; cholecystostomy; cured.—Mrs. G., 79 years, was admitted on November 12th. Two days before admission, the patient was seized with sharp sudden pain in the right hypochondrium, nausea and vomiting. She had no chills and only slight fever. The patient was not jaundiced at any time. The gall-bladder could be plainly felt, tense and bulging against the abdominal wall. Urine contained a large amount of sugar (not quantitated) but no acetone nor diacetic acid. Urine showed the usual senile changes.

On November 12th, cholecystostomy was done under chloroform. The gall-bladder lay close to the abdominal wall and was full of purulent material. Numerous small stones were also found. One stone that was impacted in the cystic duct was removed with some trouble. A rubber tube was stitched into the gall-bladder and the organ itself was sewed into the wound. Time of operation 8 minutes. A culture of the fluid showed bacterium coli (Dr. Bernstein). The patient reacted well and made a progressive and uneventful recovery and was discharged cured on December 4th.

Acute cholecystitis; cholelithiasis; cholecystectomy; cure.—Bertha S., aged 35 years, was admitted April 29, 1905. About four weeks before admission the patient had begun to suffer with pain and distention in the upper abdomen, with constipation and frequent vomiting. These symptoms continued up to the time of admission. There had then been no movement of the bowels for 36 hours and two enemata were ineffectual. The patient was three months pregnant. The general condition was good. Chief complaints: persistent vomiting, constipation.

On May 3d under gas and ether the gall-bladder was exposed and resected. Many small stones were found blocking the ducts; these were removed. Probes were passed into the hepatic and common ducts which were found to be unobstructed. A drainage tube was now inserted down to stump and several small gauze packings put in and the abdominal wound closed. Convalescence was uninterrupted and

the patient was discharged cured on May 20th with a superficial granulating sinus.

Cholecystitis; chronic; cholelithiasis; cholecystectomy; cure.—Mary S., aged 20, was admitted February 11, 1905. There had been a typical history of cholecystitis for two years before admission with attacks varying in severity and occasionally followed by jaundice. Pain was located in the right hypochondriac region and radiated to the epigastrium, right shoulder and to the back.

On admission the patient was in good general condition. There was slight icterus. The edge of the liver was palpable and a mass thought to be the gall-bladder was felt to within three fingers breadth of the umbilicus.

On March 1st cholecystectomy was performed. Adhesions made the operation somewhat difficult. Drainage to the ligated stump was instituted. The discharge gradually ceased and the patient was discharged cured on March 25th with a small superficial sinus.

Cholecystitis; stone in common duct; cholecystectomy; choledochotomy; cure.—Theresa C., aged 42, was admitted November 8, 1904. For one year before admission patient had had attacks of gall-stone colic; intervals between attacks had steadily diminished and length of attacks had steadily increased. Had lost 30 pounds in weight. Bowels had been constipated. Had been jaundiced the whole time.

On admission skin and conjunctiva had icteric hue. Nothing could be palpated in abdomen.

On November 9, 1904, the gall-bladder was removed; it was small and full of stones. The common duct was incised and a good sized stone removed. Wound closed in the usual way with tube drainage of the duct. Abdominal wall closed. On December 3d, after an uneventful convalescence, the patient was discharged cured.

Acute cholecystitis; cholelithiasis; cholecystectomy; cure.—Mrs. Augusta F., aged 31 years, was admitted May 3, 1905. One year previously she had had an attack of acute cholecystitis lasting two weeks. Four months later another occurred, after which the patient had been quite well until two months before admission. She then became jaundiced without pain or other symptoms. Chief complaint, jaundice with cutaneous irritation.

On May 4th cholecystectomy was done in the usual manner. Both liver and gall-bladder were considerably enlarged and the gall-bladder contained numerous small calculi. There were many adhesions between the gall-bladder and surrounding structures. Tube drainage was instituted after having assured ourselves that the choledochus was patent. Bile flowed very freely. Convalescence was uninter-

rupted and the patient was discharged cured on May 23d with a small sinus which was discharging bile.

Acute cholecystitis; cholelithiasis; cholecystectomy; cure.—Charlotte A., age 43 years, housewife, was admitted to the hospital July 28th. The patient had always enjoyed good health until four days before admission, when she was suddenly seized with severe pain in the right side of the abdomen near the umbilicus, which increased with the slightest exertion; the pain did not radiate. The bowels had moved after cathartics; stool not clay-colored. Nausea but no vomiting. No chills, jaundice nor fever.

On palpation an oval, elongated tender mass, moving with respiration and with the position of the patient, could be felt about 1½ inches below and to the outer side of the umbilicus. No appendicular tenderness but right rectus rigidity.

On July 28th, under gas and ether, laparotomy was performed. An enormously distended gall-bladder was found, which was excised. The gall-bladder was found thickened and hemorrhagic, with several areas of gangrene. There was one calculus.

On August 19th the patient was discharged cured.

A culture made by Dr. Bernstein on August 2d from the fluid in the gall-bladder showed streptococci.

Acute cholecystitis; cholelithiasis; cholecystectomy; cured.—Schendel R., aged 58 years, was admitted to the hospital July 8th. Two days before admission the patient was suddenly seized with vomiting and cramp-like pains in the right hypochondrium, which did not radiate. There was a slight chill with the onset of the pain. The cramps became more and more severe, the intervals becoming shorter. The patient had had an attack similar to the present one four years before.

On physical examination a very marked Head's zone, corresponding accurately to that of the gall-bladder, was noted. On deep palpation an oval, tender, tense mass, projecting downward almost to McBurney's point, was made out. The liver was indistinctly felt two finger breadths below the costal margin.

On July 8th, under gas and ether anesthesia, a cholecystectomy was performed, and an acutely inflamed, hemorrhagic and partly gangrenous gall-bladder, containing one large, black faceted stone, was removed. The cystic and common ducts were free. The wound was then drained by a rubber tube and small gauze packings. On July 24th, 16 days after operation, a large stone was found at the bottom of the wound; this was removed with forceps. The patient made an uneventful recovery and on August 19th was discharged cured.

A culture made by Dr. Bernstein on July 10th from the fluid in the

gall-bladder proved negative; another made on July 13th from the peritoneum showed B. coli communis.

Acute cholecystitis; cholelithiasis; cholecystectomy; choledochotomy; death.—Sarah C., aged 28 years, was admitted February 13, 1905. Had had typhoid fever 12 years before admission. For two years before coming to the hospital the patient had had at varying intervals symptoms of gall-stones. Last attack had been two weeks before admission during which had had severe pain in both lumbar regions radiating to the shoulders, fever, headache, chilly sensations, skin and jaundice. Stools pasty and light colored, urine highly colored, greenish-yellow.

On admission skin and conjunctiva were deeply jaundiced. The liver was palpable at the level of the umbilicus. The blood coagulation was delayed 3½ minutes beyond the normal. The white blood count showed 13,000; polynuclears being 82%.

On February 21st the patient was operated upon and a small, contracted gall-bladder was found under a large Riedel's lobe. The wall of the gall-bladder was friable and somewhat gangrenous. The organ was removed. A large stone was found in the common duct which was removed by choledochotomy. Drainage tube in common duct, gauze drain to liver and one to Morrison's space; rubber dam below packings; abdomen closed.

For three days after operation the general condition was fair and steadily improving, but on February 24th the patient suddenly became much worse. Signs of internal hemorrhage appeared and steadily became more marked. The patient was dressed; much blood escaped; wound again packed, but in spite of stimulation the pulse gradually became imperceptible and the patient died at 2 P.M.

Examination of a piece of the liver removed post-mortem revealed hypertrophic cirrhosis (Dr. Mandlebaum). It is this class of cases in which the jaundice is most dangerous because of the hemorrhagic tendency. In the present instance the bleeding was general, no large vessel having been injured.

Cholelithiasis; cholecystitis; stones in hepatic duct; cholecystectomy; hepaticotomy and choledochotomy with drainage; cure.—Annie B., aged 30, was admitted November 4, 1904. Four weeks before admission had had symptoms of gall-stone colic lasting one week; ten days before had second attack accompanied by chill and fever; vomited several times and was jaundiced. From this time till admission had had several attacks. Stools had been clay-colored and urine very dark. Was admitted during an attack.

The liver was found one finger below the free border; the right upper rectus was rigid and a tender area present midway between um-

bilicus and ensiform about the size of a dollar. Right hypochondrium tender to deep palpation.

On November 4th a cholecystectomy with drainage was performed in the usual way. At operation gall-bladder was found adherent to omentum and stomach. Cystic duct was dilated and filled with stones. Hepatic duct also dilated and a large stone felt. Common and cystic ducts had to be incised in order to get stones out of hepatic duct. Rubber tube was put into stump of cystic duct, into common duct and sutured in place. Gall-bladder was 4 inches long, wall thickened, chronic inflammation of mucous membrane. It contained many small stones.

On November 22d continuous drainage stopped. The icterus present on admission disappeared. The general condition steadily improved and on December 10th, there being but a superficial granulated wound, the patient was discharged cured.

Cholecystitis; cholelithiasis; cholecystectomy; drainage of common duct; cure.—G. H. K., male, aet. 38 years. Admitted August 27, 1905. Four years ago was operated upon for appendicitis. For several years had complained of indigestion. On May 5, 1905, had a typical attack of biliary colic; ten days later jaundice set in and increased rapidly. The stools were clay-colored and the urine dark. There was severe pruritus of the skin. Had lost 38 pounds in weight.

Physical examination: Conjunctiva and skin were deeply jaundiced. The liver percussed to the free border, below which there was tympany. The edge of the liver was palpable two finger breadths below the free border. The gall-bladder was not palpable but there was tenderness on the right side two inches to the right and one inch above the umbilicus. The spleen could not be felt.

On August 30th under gas and ether anesthesia a 5-inch incision was made over the gall-bladder region through the right rectus. Strong firm adhesions were found between the gall-bladder and the transverse colon and duodenum. During manipulations to expose the gall-bladder it burst and a few stones were expelled. The gall-bladder was then clamped at its base and removed. On examination the cystic duct was found full of stones and its lumen greatly dilated. It tore off at its union with the common duct. The latter was then freed of some soft stones and probed into duodenum. It was found patent and a rubber tube inserted and sutured. A cigarette drain was introduced down to the common duct and a gauze drain to the denuded liver surface. The abdominal wound was closed with through and through sutures. The tube at once began to discharge bile.

The patient reacted fairly well. The tube discharged bile freely. The patient had an uninterrupted convalescence.

Cholelithiasis; chronic cholecystitis; cholecystectomy; choldochotomy; death.—F. M., female, aet. 45 years, admitted August 23. 1905. For eight months previous to admission there had been frequent attacks of 3 and 4 days duration of cramp-like epigastric pain radiating to the back. The first attack was followed by jaundice which persisted and increased after each subsequent attack until two months before admission when it subsided somewhat. Bowels had been irregular; movements hard, 3 to 15 per day and for 2 months had been clay-colored. Had lost about 70 pounds since onset.

On examination the patient was markedly jaundiced. The liver was palpable two fingers above the umbilicus. The gall-bladder was distinctly enlarged and palpable. There was albuminuria and bile in the urine. The blood coagulation time was 9 to 9½ minutes. Stomach analysis negative.

The patient was kept under observation on medical service until September 12, 1905. On that day, under gas and ether, a vertical right rectus incision 4 inches long was made from the free costal border downward. The liver showed beginning cirrhosis. There was a marked Riedel's lobe. From adhesions between liver, enlarged gall-bladder, pylorus and transverse colon were divided and gall-bladder freed. Cystic and hepatic ducts were empty, but a large calculus was felt in retroduodenal portion of common duct. An incision was then made beginning at cystic and common duct junction down common duct for about one inch. Both ducts were found much dilated. A calculus about the size of a pecan nut was removed. The common duct was then probed easily into duodenum; the hepatic duct also probed easily. The hepatic and common ducts were drained with tubes. The gall-bladder was removed near its base and cystic artery ligated. A tube drain was placed in cystic duct stump. Gauze packings were placed around tubes and abdomen closed in the usual manner. The gall-bladder was thickened with areas of superficial hemorrhage and interstitial inflammation.

The patient reacted well. Drainage of bile was profuse and required change of superficial dressings at frequent intervals. On September 17th one deep gauze packing was removed and the others cut short. Drainage of bile continued freely. On September 20th tube from cystic duct and deep packings under liver surface were removed. On September 22d the tube from hepatic duct slipped out and could not be replaced. The wound was packed off with gauze and a tube inserted to bottom. This was followed by good drainage of bile.

The patient's condition following operation was poor. Vomited frequently but temperature continued normal. On September 24th dressings were saturated with blood and patient rapidly went into shock. Active stimulation was resorted to but of no avail. Under ether anesthesia wound was investigated There was general oozing

of blood from depth of wound. The patient's condition became rapidly worse. The wound was packed with gauze and closed and in spite of stimulation she died the following morning.

A wound post-mortem examination showed an enlarged and firm liver, the anterior margin adherent to abdominal wall. The wound was necrotic; all the bile ducts dilated and a cicatrix found in common duct just above papilla. On section the liver cut hard and showed multiple areas of beginning degeneration. The kidneys showed chronic interstitial nephritis with moderate congestion (Dr. Mandlebaum).

Subacute cholecystitis, cholelithiasis; cholecystectomy and drainage; death.—Hannah S., aged 58 years, admitted May 31, 1906.

Patient suffered from "indigestion" for five years before beginning of present illness, complaining of epigastric distress, eructations, cramplike pains in epigastrium and regurgitation of sour fluids. Her present illness began four months before admission to the hospital with exacerbation of the above mentioned symptoms. Pain was severe, localized in right hypochondrium, dull in character, radiating at times to back, sides and shoulder. One week before entrance into hospital the patient vomited during an attack of pain and noticed shortly afterwards that she was jaundiced. Urine dark; stools not clay-colored; bowels constipated; no chills or fever.

Physical examination on June 1st, negative except that liver was palpable 3 inches below umbilicus, indistinctly, and that there was some tenderness in right hypochondrium.

Gastric analysis June 2d: Free HCl absent; total acids 4; no lactic acid; no Boas Oppler bacilli.

June 4th an elongated mass was felt in the right iliac fossa, which was lost as the liver was reached at the level of the umbilicus.

Patient was admitted to the service of Dr. Manges but transferred to the service of Dr. Lilienthal who had advised a cholecystectomy.

June 6th, cholecystectomy through a 4-inch incision in right rectus. Gall-bladder delivered into wound after tying off omental adhesions. It was much elongated and was stripped away from the liver, clamped off and stay sutures of No. 3 chronic catgut passed through cystic duct, after which it was cut away. A few stones were found in the gall-bladder itself and a large stone down in the common duct at the papilla. Bile flowed freely. A small tube drain was introduced into the cystic duct and held by catgut sutures; small gauze packing to bed of gall-bladder, rubber drain below. Abdomen closed by layer suture. Dry dressing.

The patient reacted well but her condition later became progressively poorer and she died on June 9th with a temperature of 105.4.°

Cholelithiasis; cholecystitis; pericholecystitis; abscess; bilateral parotitis; lobar pneumonia; death.—R. G., female, aged 39 years, admitted to the hospital May 30, 1906. Family and previous history negative. Present illness began five days before admission with pain in right hypochondrium radiating around waistline and into back but not into shoulder. Vomited several times on first day and a few times subsequently. Pain did not radiate downward. Bowels were loose and no stones were noticed in stools. Pain gradually became less severe; was never jaundiced.

Physical examination was negative except for examination of abdomen. There was tenderness on pressure in right hypochondrium and rigidity of rectus. No mass palpable.

Patient was operated upon June 1, 1906. Partial cholecystectomy for acute gangrenous perforative cholecystitis with cholelithiasis and pericholecystic abscess. Three-inch incision through right rectus muscle over right hypochondrium. Upper surface of liver covered with inflammatory exudate and below it a tense, inflamed gall-bladder the size of a small orange. Between it and the stomach was an abscess cavity of large size from which pus escaped. The gall-bladder was emptied posteriorly by aspiration, pus and mucoid fluid being obtained; it was then incised at fundus and fluid and numerous stones evacuated. On account of the friable condition of the gall-bladder it was impossible to strip it away from the liver so it was tied off piece by piece circularly half way down, the ligatures being left long, and the distal half cut away. A large tube was then introduced and the sutures before passed tied to one another. Gauze drain laid alongside stump, wound packed and abdomen closed by layer suture. Dry dressing.

June 4th bilateral parotitis present.

On June 5th a three-inch vertical incision was made over each parotid gland, the gland substance being found necrotic with many small pus foci throughout. Numerous incision into gland were made; gauze drainage, wet dressing.

June 8th, first dressing. Deep packings and sutures removed. Wound clean. Right parotid gland dry and necrotic; marked sloughing and suppuration on left side. Fresh packings inserted.

Signs of pneumonia at left base were noted on June 10th. The patient's condition became progressively worse and she died on June 11th with a temperature of 106.2.°

Chronic cholecystitis and cholelithiasis; embolus (?); cholecystectomy and drainage; death.—Mary G., aet. 39 years, admitted June 10, 1906.

For many years the patient had attacks of pain in the right hypochondrium, which during the six months before admission became more frequent and more severe. The pain radiated into the epi-

gastrium and back; never downward. She passed several small stones in stool six weeks before being admitted. Vomited occasionally with attacks of pain; no jaundice.

Physical examination was negative.

On June 13th cholecystectomy through a 3-inch right rectus incision. Gall-bladder atrophic and filled with stones. It was stripped with difficulty from the liver owing to numerous adhesions, incised at its fundus and numerous stones removed. Stay sutures of No. 3 chromic catgut were passed through the cystic duct, the gall-bladder being then clamped and cut away. The duct was much constricted by ligature so that its lumen could not be found. A cigarette drain was therefore introduced with gauze packing below into bed of gall-bladder and another just above. Abdomen closed with No. 2 plain for peritoneum and muscle, No. 2 chromic for fascia, silk for skin. Dry dressing.

Patient reacted well but on June 17th she suddenly rose in bed, cried out and fell back dead. Probable cause of death embolism.

Chronic suppurative cholecystitis; cholelithiasis; stones in common duct; cholecystectomy; choledochotomy; drainage of duct; cure. Sarah C., aged 46, was admitted November 21, 1905. For the previous 6 years the patient had had occasional cramp-like pains in the epigastrium, lasting 15 to 30 minutes. She had never been jaundiced. Three weeks before admission she had had a severe attack of cramp-like pain in her upper right abdomen, radiating towards the back. Since then sharp cutting attacks of pain had been frequent, lasting 5 to 6 hours, and she had been slightly jaundiced.

On admission moderate icterus was noted but the general condition was good. The liver was found slightly enlarged and there was tenderness over the gall-bladder region on pressure. The upper part of the right rectus was rigid and a pear-shaped mass was palpable in the right upper quadrant, reaching down almost to a level with the umbilicus.

On November 23d cholecystectomy and choledochotomy were performed. The abdomen was opened by the regular incision for cholecystectomy and the liver found enlarged with a small, shrunken gall-bladder just beneath its edge. The gall-bladder was opened and thick grumous pus with stones evacuated. The gall-bladder itself was then removed with considerable difficulty. Stones were found in the common duct and it was incised in order to remove them. The wound was closed with drainage. The discharge was profuse for some weeks, but ceased and the patient was discharged cured on January 23d.

Rigidity of the upper rectus and slight enlargement of the liver may be mistaken on palpation for the gall-bladder. Operation in this case disclosed the fact that the gall-bladder could not have been palpated.

Chronic cholecystitis; cholelithiasis; cholecystectomy; cure.—Golde P., aged 28 years, was admitted March 31, 1905. Her previous history bore, apparently, no relation to the present illness. Two weeks before admission the patient had begun to suffer with severe cramp-like pains in the epigastric and right hypochondriac regions, radiating to the right shoulder, with vomiting but no jaundice. There had been some slight fever and chilly sensations.

On admission the general condition of the patient was good. The edge of the liver was palpable below the free border of the ribs, and a mass which was thought to be the gall-bladder could be felt reaching down to two finger's breadths below the umbilicus.

Cholecystectomy was performed on April 5th, in the usual manner, with drainage. The discharge gradually ceased to be biliary and became muco-purulent. This in time stopped and the patient was discharged cured on April 30th.

Chronic cholecystitis and cholelithiasis; cholecystectomy and choledochotomy; death.—Simon W., aged 28, was admitted on January 26, 1905. Five months before a cholecystotomy with removal of gall-stones and part of the mucous membrane of gall-bladder had been performed at another hospital. Since then he had had several attacks of biliary colic.

On admission there was profound icterus. The coagulation of the blood was delayed three minutes beyond the normal. In the region of the gall-bladder there was a linear scar, the site of the former operation.

On January 31st, in general anesthesia an incision was made along the scar of the previous operation. The gall-bladder which was found much contracted and densely adherent to surrounding tissues was removed. Its mucous membrane was in part necrotic. The common duct had to be opened for drainage. Wound was closed by layer suture after drainage had been put into common duct, to raw surface of liver and to Morrison's space.

The patient reacted fairly well after the operation though the pulse was rapid and weak. The day after operation the temperature began to rise and the pulse to become more and more rapid and feeble. The respirations, too, increased in rapidity until the patient presented the signs of an acute sepsis and on February 2d, the temperature having risen to 106.6,° death took place. There was no autopsy

Cholecystitis and cholelithiasis; choledochotomy and drainage; cure.—Margaret T., aged 52 years, was admitted January 13, 1905. For one year previous to admission had been suffering from occasional attacks of gall colic. These attacks had been growing more severe and lasting longer but had never been accompanied by jaundice.

On admission the liver was palpable three fingers below free border of the ribs. Blood and urine contained no bile. Stools were brown. White blood count 10,000.

Patient was treated symptomatically for about one week and on January 21st was operated upon and a much distended gall-bladder containing some large calculi was removed. The cystic duct was found stenosed admitting only a fine probe, so a fenestrated drainage tube was inserted to the stump. Gauze drain to liver and one to Morrison's space; rubber dam was placed between packings and rest of peritoneal cavity and the wound closed as usual.

February 1st. Drainage tube removed permanently.

February 4th. All packings were removed. At no time after operation was there any biliary discharge from wound.

On February 11th patient was discharged cured.

Chronic cholecystitis; cholelithiasis; cholecystectomy; drainage; cure.—Babette T., aged 56 years, was admitted April 12th, 1905. Twenty-eight years before the patient had had an attack of jaundice without pain lasting for a year. She had never been jaundiced since. About one year before admission she had had a similar attack but without jaundice and with some pain in the region of the gall-bladder. For two weeks before admission the patient had been in bed because of extreme weakness, repeated vomiting and constipation.

On admission the general condition was good. She was well nourished. The physical examination was practically negative.

Cholecystectomy was performed in the usual manner on April 14th. A tight stricture was found near the cystic duct. The gall-bladder showed chronic inflammation and contained 5 good-sized stones. Duct drainage was instituted. About 5 days after operation parotitis developed upon the right side. This continued and the gland was incised and drained on May 8th. The tissues were indurated but there was no suppuration. The discharge of bile continued for some weeks. The wound in the parotid region and that of the abdomen were entirely healed when the patient was discharged cured on May 29th.

Obstruction of common duct; partial cholecystectomy; died.—Max G., 55 years, was admitted on November 18, 1905. Eight years before admission the patient had an attack of cramps in the right hypochondrium, with pain radiating to the back. He also had jaundice, clay-colored stools and fever followed by chilly sensations. Since that time he had five or six similar attacks. The present illness began eight weeks before admission with pain and tenderness in the right hypochondrium, radiating to the back. The cramps recurred nearly every day, were sharp and cutting. Jaundice soon developed with fever, chilly sensations and sweating. The stools were clay-colored,

the urine highly colored. There was a constant pruritus which increased in severity. There was no vomiting. The bowels were irregular, moving only after catharsis. The patient lost little flesh and strength but became very weak. White blood corpuscles, 8,400; polynuclears 76%. The temperature on admission was 98.6, pulse 72 and respiration 24. Physical examiantion was negative. The urine showed bile.

On November 22d, partial cholecystectomy with exploration of the common duct for obstruction was performed under gas and ether. Drainage of the cystic duct was instituted. On November 24th, the pulse, although slow, became irregular and the tension low. The following day, the patient's condition was much improved. There was good drainage of bile. On December 3d, there was some hemorrhage from the wound which contined to the end. Although forced stimulation was used, the patient did not respond and died on December 4th.

Stricture of the common bile duct (after cholelithiasis); choledochotomy and hepaticotomy with drainage; cure.—L. K., a woman aged 50 years was admitted August 8, 1905. Since April, 1905, the patient had had a number of typical attacks of gall-stone colic. Bowels had been constipated for months. One day before admission had another attack of pain radiating to the back, in upper right abdomen. Repeated vomiting, chill and fever followed by jaundice.

Physical examination showed a well-nourished woman with moderate jaundice. Liver was not enlarged. There was very marked tenderness in the upper right abdomen. Murphy's sign present. There was no rigidity.

On August 9th under gas and ether anesthesia a 6-inch upper right rectus incision was made. A small atrophic gall-bladder palpated on under surface of liver. Common duct palpated and found negative. The duct was then incised and probed; some resistance met with but overcome. Hepatic and cystic ducts probed and found free. Common duct then incised up to cystic and hepatic junction. These ducts each incised for about ½ inch. All ducts drained with rubber tubes and sutured. Gauze drain inserted and abdomen closed by layer suture.

Patient reacted well. Drainage good. Patient had an uneventful recovery and was discharged cured September 9, 1905. Dr. Bernstein reported culture of bile sterile.

Obstructive jaundice; laparotomy; first step toward cholecystostomy; death.—James Q., aged 44 years, was admitted February 28, 1905. Two months and a half before admission (in December, 1904) dull pain had made its appearance in the epigastric and right hypochondriac regions. They recurred daily and jaundice followed shortly. The stools had been clay-colored and the urine dark.

On admission the general condition was good in spite of deep jaundice. The liver was enlarged and there was some tenderness over it in the outer part of the right hypochondriac region. The gall-bladder was enlarged and palpable.

A blood count showed the corpuscles in approximately normal numbers, with hemoglobin 85%. The latter examination could not be accurately made on account of the large amount of bile in the blood. Repeated coagulation tests showed clotting to be delayed from 10 to 13 minutes longer than normal blood used as control.

March 7th laparotomy was performed preliminary to cholecystostomy. The gall-bladder was found to be somewhat contracted. It was sutured to the peritoneum, but oozing was so severe that the stitches had to be removed and packings were carefully inserted all around the viscus. There was still a great deal of oozing. The whole wound was packed. The first dressing was done on March 9th. Only the packing over the gall-bladder was removed, those around it being left in place. An aspirating needle was introduced into the gall-bladder and several ounces of thick black material were withdrawn. The opening was enlarged and a tube drain inserted. Everything bled at the slightest touch. Packings were introduced. Oozing could not be checked. The patient grew worse and died during the afternoon of March 9th. No autopsy.

Persistent biliary fistula after cholecystostomy; cholecystectomy and drainage; plastic for ventral hernia; death.—Mary G., aet. 43, had been operated upon 2½ years before in another hospital, about 300 stones having been removed. The gall-bladder was drained by a tube for 14 days. From that time up to the present bile has continued to flow, necessitating change of dressing 3 to 4 times daily. For the last eight months there has been loss of weight and strength.

On examination general condition fair. Liver was palpable two fingers breadth below the free costal margin. Abdominal wall thin, abdomen pendulous. Scar line of previous operation extends from 3 inches below costal arch to an inch below umbilicus, parallel to and 2 inches to the right of median line. There is a ventral hernia through the scar. At its upper end is the discharging sinus, the mucous membrane of the gall-bladder presenting in its bottom.

Operation June 9th. Incision around the scar. Many omental adhesions in which the lower part of the gall-bladder and the cystic duct were embedded. Adhesions tied off and cut or separated bluntly. Usual cholecystectomy; tube drain sutured to stump of cystic duct. Separation of adhesions from the liver caused considerable hemorrhage and hemostatic sutures were passed including the liver tissue; gauze packing also applied. In closing abdomen fascia was overlapped.

On the next day patient showed signs of internal hemorrhage. Suture line opened and bleeding found taking place from the liver. Cauterized and large hemostatic sutures put in. Patient was in complete shock and despite vigorous stimulation died the next morning.

Piece of liver removed post-mortem was examined by Dr. Mandlebaum. It showed congestion; parenchymatous and fatty degeneration. No autopsy.

Persistent biliary fistula; exploratory laparotomy; death.—Lena S., aged 42 years, admitted March 1, 1906. Patient entered hospital on November 16, 1905, with a history of sharp, colicky pains in epigastrium radiating to back and iliac regions, vomiting, constipation and headache. No jaundice or chills, no blood in urine or stool. On examination a mass could be felt in right upper quadrant extending to umbilicus.

Cholecystectomy was done and a large gangrenous gall-bladder removed. Patient discharged January 13th with a persistent biliary fistula.

Patient returned March 1st markedly jaundiced. She complained of dull pain in right hypochondrium. There was much loss of flesh and strength.

On March the incision was made in median line, dense adhesions around sinus ligated and cut through; sinus laid open, duodenum opened and explored for new growth or gall-stones with negative result. It was impossible to locate or open common or hepatic ducts although bile was obtained on aspirating structures in free edge of gastro-hepatic omentum. No bile flowed into wound at any stage of operation. Opening in duodenum was closed and drainage tube inserted into fistulous tract.

Condition after operation was poor. Patient vomited continuously, pulse became feeble and she died on March 8th.

Post-mortem examination. Common duct small and shrunken. Below junction of right and left hepatic ducts a mass of fine cicatricial tissue was found almost completely constricting common duct. Hepatic ducts enormously distended above constriction. Smaller bile ducts throughout liver distended and their walls thickened. Considerable increase of connective tissue in liver substance (Dr. Fried).

General Peritoneal Infections.

We have previously pointed out that the cases of pneumococcus peritonitis form a distinct clinical entity which should be recognized as such. The onset is very acute, the signs and symptoms of a severe general purulent peritonitis develop rapidly, and in our experience

the outcome is invariably a fatal one. Operative interference is of no avail. The following case is illustrative of all of these points:

Peritonitis (pneumococcus) Incision; irrigation and drainage of abdominal cavity; death.—Celia, F., aged 5½ years, was admitted March 2d, 1905. The child had always been healthy until illness began 37 hours before, for which she was admitted. Severe abdominal cramps came on referred to the umbilicus. She had vomited several times. No convulsions or chills (a short chill in Admitting Room). Headache had been quite severe and delirium was noticed at times. No cough, cyanosis or dyspnea. Temperature 101.4°. The child was well nourished. There was marked dyspnea and numerous sonorous and sibilant râles were heard over chest, with hyperresonant note and bronchial breathing at the right apex. The abdomen was moderately distended and there was slight rigidity of the right rectus with general tenderness to palpation. The umbilicus was unduly prominent. On March 4th Dr. Koplik examined the lungs and found no signs of pneumonia. The differential white blood count showed 88% polynuclears.

On March 4th the abdomen was opened and flakes of greenish-yellow pus at once escaped. The appendix, though apparently normal, was removed. The abdominal cavity was flushed out and on account of the patient's critical condition closed with through and through sutures. The patient reacted poorly and grew steadily worse, dying next day, March 5th.

Autopsy showed diffuse peritonitis, hypostatic congestion and hemorrhages throughout right lung, and parenchymatous nephritis. The fluid, examined by Dr. Buerger, contained pneumococci.

Multiple sarcomata of the peritoneum; exploratory operation; died.—Isaac W., 22 years, was admitted on December 23d. About four months before, patient began to loose flesh and strength, have night sweats, intermittent temperatures, slight cough and blood-tinged sputum. Bowels were slightly constipated. Four weeks before admission, he began to complain of a heavy feeling in the abdomen but he noticed an enlargement of the abdomen only eight days before admission. The weakness became greater, his bowels became loose so that he had three to five movements a day. At time of admission, the temperature was 100.4°, pulse 140 and respirations 24. Physical examination of the abdomen—distended, enlarged. Dulness in both flanks, not movable. There was dulness between the pubes and the umbilicus, extending laterally even when the bladder was empty. Rectal examination showed bulging of the anterior wall with a feeling of tenseness and fluctuation. On either side, firm nodules, about the size of almonds, were palpable.

Exploratory laparotomy was performed under cocaine and Schleich's solution on December 29th. On opening the peritoneum, bloody fluid escaped. Soft granular masses were felt extending in all directions. Some nodules were felt in the mesentery, several of which were removed. The pathological report was small spindle celled sarcoma (Dr. Mandlebaum). The patient reacted well from the operation but on the following day the pulse became rapid and weak and the extremities became cold. Patient died that same morning.

Spleen.

The following two cases are of interest as they illustrated the fact that, in spite of the serious and extensive injury to an important organ, the patients can be saved by prompt surgical interference. In both cases there was active hemorrhage at the time of operation, which would of itself have been sufficient to cause a fatal termination. It is interesting to note that in neither case was there any change in the number and relative proportions of the blood cells after the removal of the spleen.

A third case, one of rupture of a splenomegalic organ will be elsewhere reported. The rupture was sealed by omentum but hemorrhage recurring, operation was resorted to, the enormous spleen weighing over 4 pounds being removed. The patient recovered and is at this writing greatly improved in health.

Traumatic rupture of spleen; splenectomy; cure.—Joshua J., aged 15 years, admitted February 10, 1906. One hour before admission, while coasting down a hill, patient struck left side of his body against a tree with great force. Complained of severe continuous pain in the left hypogastrium and soon after of frequently repeated knife-like pains in same region. Pain was increased on deep inspiration and on coughing. No bladder or rectal symptoms; did not vomit or lose consciousness.

On admission was extremely blanched and grew visibly paler. Pulse increased from 98 to 120 during examination and was very soft and compressible. There was no area of liver flatness; tympany 1½ fingers above free border and after an hour total loss of liver dulness. Abdomen rigid, particularly upper left quadrant; exquisite tenderness in upper left quadrant; movable dulness in left flank.

On opening peritoneum about one pint of bloodelot and free blood escaped. Spleen was found torn into three parts which were ligated and removed; pedicle ligated; intestine found uninjured. Skin closed leaving drain to pedicle.

Repeated blood examinations showed transient leucocytosis, which fell to normal in a few days, and a constantly increasing hemoglobin. Wound healed promptly. Discharged cured, March 12th.

Traumatic rupture of spleen; splenectomy; cured.—Mendel S., aged 3½, admitted June 14, 1906. On day before admission child had been run over by a wagon; he was carried home conscious; child did not complain of any pain after accident, but there was obstipation, not influenced by enemata.

On examination abdomen was found generally distended and rigid; evidences of free fluid in abdomen; no localized tenderness. Temperature on admission 101,° pulse 128.

An immediate exploratory laparotomy was done, which revealed a ruptured spleen, the organ being torn across into two halves; there was active bleeding going on at the time of operation; the pedicle of the spleen was ligated off and the organ removed in two sections. Small cigarette drain to stump; wound sutured. Patient made a good recovery, being discharged cured, July 15th. Daily examination of the blood showed practically no variation in its constituents.

Intestines.

The mortality in the intestinal obstruction cases still remains very high, partly owing to the very nature of the affection itself, and partly owing to the unfortunate fact that a large proportion of our patients do not apply to us for aid until they are already *in extremis*. Still the occasional fortunate outcome in a desperate and seemingly hopeless case, encourages us to give every patient, not absolutely moribund, the benefit of operative interference.

We have found that frequently better results can be obtained by doing preliminary enterostomy, and deferring operative procedures which look toward the permanent removal of the cause of the obstruction.

The remarks made above with reference to the obstruction cases apply with equal force to the cases of intestinal cancer; the vast majority apply for treatment much too late for us to be able to hold out any hope of permanent cure.

An intestinal evacuating trocar, devised by Dr. Lilienthal, has proven of value in emptying by aseptic puncture the distended loops.

Tuberculous ulceration of the cecum and colon; general miliary pulmonary tuberculosis. 1. Excision of the cecum with ileo-colic (button) anastomosis. 2. Incision and drainage of localized abscess; death.—

L. T., aet. 50, female, was admitted to the hospital October 17, 1905. Her father died of tuberculosis; her husband of cancer, otherwise the family history was negative.

Previous history: Typhoid in youth (?). No evidence of pulmonary, cardiac, or nephritic disease. No symptoms of syphilis. The first four pregnancies resulted in miscarriages at three or four months. Never miscarried after these, and ten healthy children were born. Menopause took place five years ago. Bowels have always been constipated.

Present illness: Began three months before admission with anorexia and occasional abdominal cramps. Bowels became loose, averaging four to five movements daily, occasionally the movements contained mucus and blood. There was progressive loss of flesh and strength. The abdominal pains could not be definitely described. There was no distention; no jaundice; no urinary symptoms; no vomiting.

Physical examination on admission showed a fairly well nourished woman. The skin was sallow with a subicteroid tint; the mucous membranes were pale. Over the right chest posteriorly down to the scapular spine there was dulness, increased voice and fremitus, bronchovesicular breathing and a few subcrepitant rales. The liver edge was palpable three fingers' breadth below the costal margin, sharp, firm and not tender. Tip of the spleen was palpable. The abdomen was generally tympanitic; no fluid in the flanks; no rigidity; slight tenderness about the umbilicus. The cecum and ascending colon were thickened, firm, indurated, and irregular; no glands palpable. Stomach contents and feces contained some blood; otherwise negative.

Operation, October 25, 1905: Midumbilical incision; many adhesions divided. There was a hard, nodular mass in the anterior saccule of the cecum, with several large, hard glands in the neighborhood. The appendix was bound down in a mass of adhesions. A tape was passed around the ascending colon, and one around the lower end of the ileum. Clamps were placed inside the tapes. The intervening portion was excised en masse, the exposed ends being carbolized. One half of the Murphy's button was placed in the cut end of the ileum, the other half was passed into the cut end of the colon and was brought out through a lateral opening made in the colon two inches up. The colon was then closed by through and through sutures reinforced by Lembert stitches. After the button was closed, the anastomosis was reinforced by interrupted intramesenteric sutures. The median incision was closed up and drainage through the right flank was employed. The pathological report (by Dr. Mandlebaum) on the mass removed was tuberculous ulceration.

Post-operatively the patient did not do well. The temperature rose to 101° and then began ranging irregularly between 101° and 103°, the pulse was always above 100. There was primary union in the median incision, but later broke down. A fecal fistula developed

through the counterincision. The button could be felt through the fecal fistula. The patient was put on vigorous mixed treatment without improvement. Although there was no cough the signs in the lungs was progressing. The white count was low, and the differential counts were normal. The patient was steadily losing ground.

Operation, November 27, 1905. Under anesthesia, the button was found high up in the rectum and removed. A right rectus incision was made. Numerous adhesions were divided. After the general peritoneum was walled off, a deep-seated abscess containing foul-smelling pus was evacuated and a drain was inserted.

The shock of the operation was too much for the patient and she died the next day.

Post-mortem: Local peritonitis. Tuberculous colitis. In right upper lung cheesy tuberculosis; in the rest of the lung subacute miliary tuberculosis (Dr. Libman).

Perforated duodenal ulcer; suture of ulcer; secondary suture of ulcer; cured.—Max B., aged 30, admitted February 17, 1906.

According to the patient's own statement he had been operated upon six years previously for an intra-abdominal epigastric abscess. For two weeks previous to admission he had been complaining of anorexia, nausea, and constipation. For two days he had had sharp pains in epigastrium, with vomiting and dizziness.

Physical examination was negative except for the presence of old tarry blood in the rectum, and slight tenderness in the right hypochondrium. A test-meal showed free HCL, 69, total acidity 93, and old clotted blood in stomach.

During the two days following admission the patient grew steadily paler and the hemoglobin fell from 100% to 60%.

On February 24th a laparotomy was done. The whole right hypochondrium was found matted down with adhesions; on separating these a perforated ulcer of the descending portion of the duodenum was found, about the size of a twenty-five cent piece. The edges were brittle and could not be united by Lembert suture. Five catgut sutures were passed through entire bowel wall just outside edges of ulcer, closing it. Suture line was strengthened by grafting a piece of omentum over it. Drain to suture line; abdomen closed.

Patient reacted well and one week later wound was healed. The following day the wound reopened and a profuse greenish watery discharge appeared. Evidently this was due to breakage from suture line.

Patient was at once taken to operating room and wound re-opened. It was found that suture line had given way and the ulcer was again wide open. The edges were approximated and turned in with No. 1 chromic catgut going through all coats of intestine. A layer of Lem-

bert sutures was passed over this. The transverse colon was then drawn up and united to suture line by a layer of Lembert sutures. Wound again drained as before and abdomen closed.

This time convalescence was smooth and patient was discharged cured May 5th.

Chronic intestinal obstruction due to bands; laparotomy and division of bands; cure.—Elizabeth K., aged 61 years, was admitted December 14, 1904. For four days before admission she had had the symptoms of chronic intestinal obstruction. On admission the cause of the trouble was obscure. December 18th, due to repeated enemata the condition was finally relieved, the patient having a large stool.

On December 28th symptoms had again returned, this time being more acute in character. Operation in general anesthesia was undertaken, December 30th. A number of dense bands were discovered, some from ascending colon to transverse colon, others from bladder to colon. These were divided. The omentum was shrunken and chronically inflamed. It was covered with cicatrices which were white and glistening and of a cobweb appearance but very firm in texture. A large V-shaped piece was removed for examination. There was immediate relief of the obstructive symptoms but the cutaneous part of the wound was slow to heal. Paroxysmal tachycardia gave cause for alarm for a time, but the patient's condition was never critical. Discharged February 5, 1905.

Intestinal obstruction; celiotomy; death.—Julius B., aged 48 years, was admitted January 25, 1905. A similar attack had occurred 7 years before. He had had a left inguinal hernia for 8 years. The illness for which he was admitted came on five days before with the symptoms of intestinal obstruction.

On admission the general condition was poor, though the patient was well nourished. The abdomen was distended and both tender and slightly rigid in the lower left quadrant.

On January 25th laparotomy was performed. On opening the abdomen a greatly distended loop of small intestine presented, and had to be punctured. The patient's condition became very bad and the operation was terminated with enterotomy of the distended loop. Death followed the next day, January 26th.

Strangulation and gangrene of a Meckel's diverticulum; entero-enterostomy and enterostomy; death.—December 20, 1904, Florence M., 7 years old, was admitted to the hospital as an urgent case. She had just recovered from pertussis. Two days before admission she had had an attack of acute epigastric pain had vomited and had had a chill. Castor oil had not caused an operation of the bowels.

On admission the abdomen was distended and rigid, being especially tender in the flanks. The tongue was coated and dry. There was elevation of temperature, a rapid pulse and the general appearance of a child suffering from peritonitis. Movable dulness in the flanks made the picture more characteristic.

Abdominal section through the lower right rectus was followed by a free gush of bloody serum and a gangrenous Meckel's diverticulum, boot-shaped and about 6 inches long, was found about 18 inches from the ileo-cecal valve, its tip being bound down by an adhesion in the right flank. The gangrene seemed to have been caused by constriction around a fold of mesentery. Parts of the adjoining intestine as well as the diverticulum were completely gangrenous. There was mesenteric thrombosis and a number of enlarged and infected lymph nodes were found. The diverticulum was incised at is apex and the legs of the loop of gut were anastomosed with a rubber ligature. The gangrenous mass was left outside the abdomen and the general cavity guarded as well as possible by packings. The patient did not rally and died the next day.

Volvulus of intestine due to Meckel's diverticulum; excision of Meckel's diverticulum for intestinal obstruction; enterotomy and drainage for intestinal obstruction; death.—Moritz E., aged 20, admitted February 20, 1906. Three nights before admission awoke with severe cramps in upper abdomen and chilly sensations followed shortly by frequently repeated vomiting. Two days before admission and again one day before admission after large doses of citrate of magnesia there was passage of a few hard scybala and some flatus. Cramp-like pains increased in severity and patient had sharp knife-like pains in right iliac region. Vomiting stopped. On the morning of admission there was sudden diminution of pain and patient felt better for a time. This was followed by an increase in symptoms.

Patient was admitted in collapse. Abdomen was somewhat distended; rigidity of recti, especially in lower right quadrant. Dulness in right iliac region and movable dulness in both flanks. Tenderness over right lower quadrant, most marked in McBurney's point. No mass palpable abdominally or per rectum. Facies peritonitic. Heart action feeble. Pulse barely perceptible.

Operation was postponed on account of patient's condition until February 25th when abdomen was opened and a Meckel's diverticulum was found adherent to abdominal wall and forming a band about which several feet of small intestines had slipped, and becoming twisted on itself had formed a volvulus. The volvulus was untwisted and the diverticulum removed.

After operation patient's condition continued poor. He became much distended and the same evening a small incision was made to

right of median line at level of umbilicus and the first distended loop was punctured with Dr. Lilienthal's intestinal trocar, irrigated with saline solution and packed around with gauze.

Patient did not recover from his collapse and in spite of active stimulation died three hours later.

Post-mortem not obtained.

Traumatic perforation of intestine; general sero-sanguinous peritonitis; enterostomy and drainage of pelvis; death.—Hans D., 29, admitted February 14, 1906, was struck in lower part of abdomen by falling elevator. He was able to walk to the bed and complained of slight pain in pubic region. On examination there were several ecchymotic areas on both thighs. Abdomen negative; patient in shock and a hematoma the size of an egg in left inguinal region along the cord. Seventeen hours after accident patient's condition was about the same. He complained of severe colicky pains in lower part of abdomen. There was some resistance but no tenderness or rigidity. Three hours later (20 hours after accident) he suddenly collapsed, pulse rapid and almost imperceptible, extremities cold. Abdomen slightly rigid and tender, slight movable dulness in flanks. Vomited once just before operation.

Under onesthesia a mass was felt in lower right abdomen and there was a distinct fluid wave. On opening peritoneum sero-sanguinous foul-smelling fluid containing fibrin flakes and feces escaped. A longitudinal perforation about one inch long was found in a loop of small intestine. A large rubber tube was sewn into this and the loop brought to the surface and packed off. During operation pelvis was irrigated, then Chamberlain tube and a large glass drain left in place. Condition was so poor that an intravenous infusion was given on the table.

Patient remained in shock and died 12 hours after operation .

Post-mortem not obtained.

Intussusception (ileo-colic); laparotomy; death.—A. M. S., a boy aged 5 years, was admitted September 27, 1905. One week before admission he had suffered from an attack of ileo-colitis. For 8 hours before admission there was obstipation; enemata were inefficacious. By rectum a mass was felt high up. There was a bloody discharge from the rectum.

The general condition was extremely poor and the patient was operated upon immediately after admission. Under chloroform anesthesia a 3 inch median incision was made. A large intussusception of ileum into large intestine with the apex at the splenic flexure was found. Reduction by manipulation was unsuccessful as the ileum was strangulated where it entered the colon. The patient's condition at this stage

became extremely poor and the abdomen was closed. He died a few hours after operation.

Perforation of small intestine by fish-bone; enterostomy; death.—Adelaine T., aged 58, admitted June 13, 1906.

Three days before admission patient was seized with severe cramp-like pain in the upper abdomen. Since then there had been obstipation; had vomited constantly.

On admission the patient's condition was only fair; pulse rapid. Local examination revealed marked general abdominal distension, rigidity, and tenderness; point of most marked tenderness just above and to the left of umbilicus. There was moveable dulness in the flanks.

An incision was made through the fibres of the left rectus. Abdomen was found full of purulent fluid. There was a fish-bone sticking through the wall of the ileum; this was extracted, and a rapid enterostomy done by suturing a rubber catheter into the same opening. Abdomen closed by through and through sutures.

The patient's condition grew steadily worse and she died a few hours after operation.

Abscess of abdominal wall due to perforation of sigmoid flexure by foreign body; incision; extraction of foreign body, and drainage; cured.—Nathan L., aged 51, admitted June 13, 1906. Six weeks before admission patient had first noticed a small tender mass in the left iliac region; the mass slowly increase in size and was becoming more and more tender.

On examination there was a smooth, round, tender mass in left iliac region close to anterior superior spine. No impulse on coughing. Mass gave the impression of being a tumor of the abdominal wall. Polynuclears 75%; W. B. C. 12,000.

On June 15th an incision was made into mass; it was found to be an abscess containing several drachms of pus; the sigmoid flexure was adherent to anterior abdominal wall, and sticking out from the lumen of the gut was a piece of wood one inch long having the shape and appearance of a tooth-pick. This was extracted. The wound was packed with gauze. It healed kindly and the patient was discharged cured June 28th.

Carcinoma of transverse colon with obstruction; multiple enterotomies and enterostomy; resection of carcinoma and partial anastomosis; death.—Solomon F., age 44 years, transferred from medical side March 23d with the following history.

For some time patient suffered from attacks of abdominal cramps which occurred without reference to ingestion of food. Two weeks before admission he had an attack which was much worse than any

previous one. During the attack he vomited twice. Never noticed blood or mucus in stools or any change in character. They were sometimes diarrheal. Cramps were relieved by belching gas or passing flatus. Lost considerable flesh and strength.

On examination abdomen was found distended; there was slight movable dulness in both flanks and ascending and descending colon could be mapped out. Visible peristalsis could be elicited by tapping abdomen.

On March 23d small right sided McBurney incision was made for exploration. This was unsatisfactory and was closed and large vertical incision made to left of median line. Small intestine found enormously distended and Dr. Lilienthal's intestinal trocar was introduced in several coils and large amounts of intestinal contents evacuated. Openings were closed by purse-string Lembert sutures surrounded by another row of Lembert sutures. A carcinomatous mass was discovered in transverse colon. It was drawn into upper part of wound and its mesentery ligated off. Lower part of wound closed and affected loop anchored into wound. Gut distal to tumor tied off; proximal portion opened and rubber tube inserted for continuous drainage.

On March 25th loop containing carcinoma was cut away and end to end anastomosis done, the ends being only roughly approximated. A large rubber tube was introduced into proximal portion.

Patient did fairly well but during afternoon of next day he went into collapse and died.

Specimen: Annular carcinoma almost completely constricting lumen (Dr. Mandlebaum).

Intussusception and volvulus; resection of intestine; death.—Betty A., aet. 30, admitted May 24, 1906. For four days patient had had general abdominal cramps and persistent vomiting of greenish material; obstipation. At operation an intussusception of the small intestine four inches long was found, and in addition a double twist of the affected loop around its mesentery. As all attempts to reduce the intussusception were unavailing, a resection, with end to end anastamosis by Murphy's button, was done. The patient stood the operation very poorly and died four hours later.

Intestinal obstruction due to gall stone; enterotomy and extraction; cured.—Amanda B., aged 68, was admitted April 28, 1906. For the past four days patient had been suffering with all the symptoms of acute intestinal obstruction. Examination showed slight general abdominal distention and tenderness. Tenderness was most marked to right of umbilicus where at times distended coils of gut were visible; slight movable dulness in flanks. Temperature, 101°. Rectal examination negative.

A four-inch right rectus incision was made, and on following up a distended loop of gut, a large gall-stone was found, completely obstructing the lumen of the ileum. A transverse incision was made in the gut, the stone removed, and the opening closed by a triple layer of Lembert sutures. Small drain placed down to suture line and abdomen closed. No stones were felt in the gall-bladder at operation. The stone removed measured 1¾ inches by 1 inch, and was oval; no facets. Convalescence was somewhat tedious, and interrupted by superficial necrosis of wound, but patient was discharged cured June 27th.

Intestinal obstruction; due to diaphragmatic hernia; enterotomy and colostomy; died.—Rudolph C., 19 years, was admitted December 1st. His illness had started four days before with sudden vomiting and severe abdominal pain. Bowls did not move. He vomited daily, two or three times. The vomitus was greenish in color and very acid. The bowls could not be moved even with the aid of enemata and catharsis. The abdominal pains became more severe and colicky and finally localized themselves in the right lower abdomen. There was slight fever, but no chills. The abdomen gradually increased in size. Not even flatus could be passed. The temperature on admission was 99.2, pulse 88, respirations 28. W.B.C. 16,000 polynuclears 73%.

Physical examination of the abdomen showed marked general distention. Abdominal respiratory movements were almost absent. There was moderate rigidity of both recti, especially the right. There were general phenomena of peritoneal irritation. There was marked tenderness in both iliac fossæ, more marked in the right. There was movable dulness in both flanks and general tympany. Rectal examination disclosed bulging posteriorly.

On the day of admission the patient was operated upon under gas and ether. First an incision was made in the right iliac fossa from which cloudy fluid escaped. There was slight injection of the serosa. A second incision was made through the median line. Both small intestine and ascending colon were punctured, allowing the escape of a large amount of intestinal contents. Both the descending colon and sigmoid seemed flaccid. Both enterotomies were closed. The hand in the abdomen disclosed the presence of an obstruction and a small mass in the splenic region of the colon; but on account of the condition of the patient and the inaccessibility of the part, temporary colostomy was performed at the site of the obstruction. Despite rigorous stimulation the patient did not respond, and died on the following morning. The temperature had risen to 103.4°.

Wound examination after death (Dr. Libman) showed a diaphragmatic hernia just beyond the left leaflet of the diaphragm, containing

omentum, which, by a band-like elongation, had pressed down on the splenic flexure of the colon, causing obstruction.

This case illustrates an extremely rare form of obstruction. It was, naturally, quite impossible to diagnose anything excepting ileus. Had the patient applied for treatment at the Hospital a day earlier, it is our belief that he might have been saved.

Tumor of ileo-cecal junction; resection of ileo-cecal junction; death.—Barnett S., aged 25 years, admitted February 27, 1906. Eight days before admission had an attack of vomiting, constipation and cramp-like pain in right iliac fossa which became burning after two days. He had had a similar attack four months before. On admission abdomen was flat, asymmetrical; there was no rigidity, and midway between the umbilicus and right anterior superior spine there was a small, tender, rounded mass.

At operation, February 28th, a hard, firmly adherent tumor was found, involving the wall of the cecum and last part of ileum and infiltrating adjacent mesentery. There were also several large, soft mesenteric glands. Mesentery was ligated off proximal to tumor mass, cecum and ileum cut between intestinal clamps and whole tumor removed. End to end anastomosis by suture between colon and ileum; lumen of colon being partly closed to make it same calibre as ileum.

A week after operation March 6th, patient developed a large fecal fistula. The following day temperature began to rise. Blood count showed leucocytosis of 28,000 with 90% polynuclears. On March 9th temperature was 103.8°. While the wound was being dressed patient vomited, complained of headache and dizziness, gasped several times and fell back dead.

Carcinoma of sigmoid; perforation; peritonitis; laparotomy and drainage of sigmoid and peritoneum; death.—Judah N., age 42 years, admitted February 5, 1906. For years had four to five stools a day. For past eight months eight to nine stools a day without bleeding or pain. Had felt run down for two months before admission and suffered occasional abdominal pain. Ten days before admission suddenly became constipated and had severe abdominal cramps. Some loss of flesh and strength. Was under observation on medical side for nine days.

Physical examination negative except for marked visible peristalsis, which was accompanied by severe abdominal cramps.

On February 15th, about 11 A. M., patient complained of sudden severe, general abdominal pain, and vomited some yellow fluid. He went into collapse. Abdomen became distended, tender and so rigid that nothing could be palpated. Liver dulness obliterated; some dulness in left flank, no movable dulness. No mass could be felt per rectum.

Diagnosis of perforation was made. Peritoneum was found filled with semi-solid feces, and there was a perforation in upper third of sigmoid, which was drawn into the wound after peritoneal cavity had been irrigated and drainage tubes inserted. Lateral incisions in abdominal wall and tubes inserted.

Condition poor and patient died an hour after operation.

Post-mortem: Annular tumor about 6″ above anus—adeno-carcinoma. About 14″ above anus a perforation about ½″ square was found. Metastatic glands in mesentery (Dr. Cohn).

Carcinoma of the sigmoid and rectum; resection of sigmoid and rectum and closure of fecal fistula; cured.—Moritz G., 38 years, was admitted on August 10th. For six months past he had vague pains in the abdomen, especially after eating. He lost about 15 pounds. There was no anorexia or vomiting. He had pain when his bowels moved and for past three weeks had diarrhea.

The day after admission, his temperature rose to 103.2°, and he had a chill. W.B.C., 13,600. Again the temperature rose three days following. On August 17th a sausage-shaped mass was palpable in the left umbilical region, which extended transversely from the median line to the axillary line. It was tender and freely movable in all directions.

On August 18th, resection of the colon was done under gas, ether and chloroform. A large mass was found in the descending colon, involving the mesentery. A loop of gut was excised, and the ends anastomosed with a Murphy's button. Pathological report was "malignant adenoma" (Dr. Mandlebaum).

The patient was in very poor condition after the operation and had to be stimulated. On September 4th, the Murphy's button was removed. The patient began slowly to improve, but a week later, developed an ischio-rectal abscess, which was incised under local anesthesia. A fecal fistula developed through which all feces passed. This was finally closed on November 15th, the patient being discharged cured on December 7th.

Carcinoma of the rectum; colostomy and enterostomy; died.—Mr. K., was admitted on December 13, 1905. On December 15th, a colostomy was performed. Began to get weaker and weaker. There was marked distention and continual vomiting. On December 17th, an enterostomy had to be performed. Patient died that same night.

Chronic intestinal obstruction; ileo-sigmoidostomy; cured.—Mr. P., 25 years, was admitted to the Hospital on December 15, 1905. Patient for the past year had suffered from cramp-like pains in the abdomen which at first only occurred at intervals of a few days. Later the cramps came on more often, were accompanied by nausea

and vomiting, and usually occurred just after meals. These attacks became as frequent as two or three times a day. There was severe hiccough, and he became weak and emaciated. His abdomen grew more and more distended. His bowels moved three to four times a day, the stools being well formed.

On physical examination the abdomen was tympanitic with movable dulness in the flanks and an undefined mass in the right iliac region. Large coils of intestine were plainly visible on ordinary inspection. Incision in right iliac region revealed an inoperable tumor of the caput coli, firmly adherent to the pelvis. There were many hard lymph nodes in the mesocolon, extending in a chain to the spine. The tumor being inoperable an ileo-sigmoidostomy by suture was done through a left iliac wound. Pathological report showed this to be carcinoma. The wounds healed well and the patient was discharged on January 5, 1906, his symptoms relieved.

Carcinoma of the sigmoid; resection of the sigmoid flexure; died.—Pincus G., 55 years, was admitted on December 12, 1905. Patient felt sick for four weeks before admission. He had been markedly constipated, but there was no pain on defecation and no blood noticed in the stools. His appetite was very poor, and he had felt weak. He had an occasional cramp-like pain in the epigastrium. Never vomited.

Physical examination was negative except the rectum. There were a few distended hemorrhoidal veins at the anus. Above the prostate and anterior to the rectum was a hard mass, smooth and rounded in outline, freely movable and appearing not to be connected with the rectum.

On admission the temperature was normal, pulse 98, respiration 24.

On December 15th a resection of the sigmoid flexure with side to side anastomosis was done. A Murphy's button was used. After excision of the sigmoid, which contained a hard mass, a cigarette drain was introduced down to the resected area.

The patient reacted well from the operation. On December 20th the patient began to fail and would not respond to active stimulation. He died the morning of the 21st, the pulse having risen to 142, and the temperature to 101.2°.

Appendicitis.

The operative treatment of these cases has not recently undergone very material changes. The reduction of all operative manipulations in the peritonitis cases to a minimum has proven very satisfactory. Washing out the peritoneal cavity has been relegated to the past; very little mechanical cleansing of the peritoneum is resorted

to; usually one small drain is inserted; the abdomen is closed about this by layer suture, and the infection of the peritoneum is allowed to take care of itself. In the after-treatment elevation of the head of the bed (Fowler's position), continuous rectal irrigation with saline solution after the method recommended by Murphy, and restriction of peristalsis by the frequent administration of moderate doses of morphine have proven of great value.

As in former years we have occasionally met with new growths of the appendix where clinically an appendicitis had been diagnosed.

In the two years there were 415 operations for appendicular disease with 27 deaths. This includes all cases of peritonitis arising from the appendix.

Acute perforative appendicitis; suppurative diffuse peritonitis; appendicectomy and drainage; cure.—Harry K., 11 years of age, was admitted January 25, 1905. Three days before he had had severe sudden abdominal pain with vomiting and constipation. Pain more marked in right iliac region. No chill. There had been progressive aggravation of symptoms.

On admission there was general abdominal tenderness, some distension and the usual signs of peritonitis. Rigidity, especially noted on right side. A thrombosed hemorrhoid projected from anus. The pulse was 96; temperature 98.8°.

Immediate operation. Under anesthesia mass clearly palpable in right iliac region. On section there was edema of abdominal walls. Within there was much free, thick creamy pus, and a gangrenous perforated appendix which was removed in the usual manner. Wound closed with single cigarette drain into pelvis. No flushing or irrigation of abdominal cavity.

On February 21st, after a smooth convalescence, the patient was discharged cured. The drainage into the pelvis had been discontinued for only a few days.

Gangrenous perforative appendicitis; sero-purulent peritonitis; appendicectomy and drainage; cure.—A. H., male, aet. 24. Re-admitted July 8, 1905. This patient was admitted to the Medical service (Dr. Brill) on June 12, 1904. At that time he presented symptoms of chronic intestinal obstruction due to ulceration and stricture of the ileum, for which resection of the small intestine ,end to end anastomosis with a Murphy's button was performed. The patient made an uneventful convalescence, but the button was never recovered.

On July 8,1905, he was re-admitted with the following symptoms: One week before there had been sharp, intermittent pains in the

lower half of the abdomen. The onset of this attack was sudden and was accompanied by chills and vomiting. There was fever and profuse sweating. The bowels were constipated and did not respond to enemata.

The physical examination showed a well-nourished man. The abdomen was not distended or rigid; there was some tenderness over the right lower abdomen. Rectal examination proved negative. Temperature and pulse normal. One day after admission the pains increased in severity and the bowels moved after a high enema. Temperature rose to 102.8°; pulse 124. The entire abdomen was tender and there was extreme sensitiveness in the right iliac region. Per rectum there was general pelvic tenderness. Perforation of one of the abdominal viscera, probably due to the retained button was suspected.

Accordingly, under gas and ether anesthesia, a 3″ right rectus incision was made. On opening the peritoneum free fluid escaped. A mass was felt in the right iliac region, which proved to be a thickened appendix with a strangulated mesenteriolum. Appendicectomy was performed by ligature and cauterization method. The abdomen was drained and closed with layer suture. The appendix was about 2¼″ long; its tip thickened and gangrenous with a large perforation. Dr. Bernstein reported colon bacillus in the culture from the peritoneal fluid.

The patient re-acted well, and made an uninterrupted recovery. He was discharged cured on August 2, 1905.

On August 20th he was readmitted. The previous day after a hearty dinner he had been suddenly seized with severe recurring abdominal pains and persistent vomiting. Bowels since the onset had been constipated; did not respond to enemata. The abdomen was found slightly distended. No rigidity nor tenderness. Some movable dulness in right flank. Rectal examination proved negative. Under chloroform anesthesia a 2½″ median abdominal incision below the umbilicus was made. A distended loop of small intestine was found adherent to the anterior abdominal wall by a broad band of adhesion. This was separated and a few Lembert sutures put in to control bleeding from the torn peritoneal surface of the intestine. Several small band-like adhesions between the omentum and the gut were found and divided. Careful palpation of the abdomen proved negative, except for a chain of enlarged glands along the abdominal aorta. The abdomen was closed by layer suture.

The patient re-acted well. The bowels moved three times the day after operation. He made an uninterrupted recovery and was discharged September 2, 1905.

Obliterative appendicitis; gangrene of cecum; perforation; appendicectomy and drainage; death.—Harry L., aged 6; first attack of ap-

pendicitis began four days before admission with pains in right iliac region, vomiting and constipation. There was some fever; no chills.

On admission there were tenderness and rigidity in right iliac region, and there was a mass palpable about the size of a walnut.

Operation: Intermuscular incision over mass; numerous adhesions between appendix and intestines tied off; appendix removed; cigarette drain to bed of appendix; nothing abnormal in appearance of cecum; abdomen closed by layer of suture. Appendix showed almost complete obliteration of lumen, no gangrene. Patient did well for first two days after operation. At the first dressing slight retention was found and a rubber drainage strip inserted. Following this, the appearance of the wound remained satisfactory. One week after operation, the pulse and respiration suddenly became rapid, the child went into collapse and died within a few hours with marked abdominal distention.

Wound Post-mortem: Complete gangrene of cecum, with a perforation and extravasation of fluid feces into the peritoneal cavity. No peritonitis.

Acute gangrenous perforative appendicitis with diffuse peritonitis; appendicectomy and drainage; death.—I. N., male, aged 11 years, admitted July 31, 1905. Three days before admission he was seized with severe abdominal pains which became localized in right iliac region. Vomited several times and had fever. Bowels last moved two days before admission. Patient had a distinct septic look. The abdomen was rigid and distended, with marked tympany and movable dulness Marked tenderness in right iliac region. Per rectum a distinct fulness felt. Temperature on admission was 100.4°; pulse 122; respiration 30.

The patient was operated upon shortly after admission under gas and ether anesthesia. A 3″ Kammerer incision was made. A foul greenish-yellow pus escaped. The appendix was retrocecal and removed by ligature and carbolic acid cauterization method. A cigarette drain inserted and abdomen closed by layer suture. Dr. Bernstein reported B. coli communis and streptococcus in peritoneal fluid. Appendix mucosa was gangrenous for one inch from tip with a minute perforation.

Reaction was fair. The day following operation the patient began to vomit repeatedly and was delirious. General condition was poor. Temperature rose from 99° to 102°. Enemata were slightly effectual. A blood-culture was taken on August 4th and proved negative. On August 7th, first dressing was done, the drains removed and followed by feculent discharge. Temperature fell and patient's general condition improved. On August 8th another blood-culture proved negative. Discharge from wound continued and patient seemed to be

comfortable until August 30th, when he began to have diarrhea. On September 3d temperature rose suddenly to 102°. The general condition was very poor; active stimulation became necessary.

On September 4th, under chloroform anesthesia, wound was examined and nothing found. Temperature rose to 104.4° General condition was septic. Emaciation was rapid. Complained of pain in pelvis. There were involuntary urination and defecation. Vomiting set in and was frequently repeated. Condition rapidly grew worse and emaciation was very rapid. The child died on September 13th with a subnormal temperature, 97.4°.

A wound post-mortem examination (Dr. Epstein) showed peritonitis with thickened peritoneum. There was matting together and firm adhesion of loops of small and large intestine. A localized abscess cavity in the pelvis completely encircling the rectum contained about four ounces of dirty-colored pus.

Lungs: Both apices contained old and new tubercular foci, and the middle and lower lobes multiple abscesses. The heart showed acute endocarditis with vegetations. Both kidneys contained multiple miliary abscesses and hemorrhagic infarcts.

Appendicitis; gangrenous; perforated; general purulent peritonitis; appendicectomy and drainage; death.—William S., aged ——, was admitted March 12, 1905. The illness had begun eight days before on March 4, 1905, when the patient ate unwisely of various pies. After indigestion for two days he was seized with severe abdominal cramps, which lasted intermittently till two days before admission. The day before admission there was an attack of agonizing cramp, after which the pain grew less severe, but became constant. Bowels were at first constipated, but had been quite loose for the previous few days. There had been vomiting, fever and one chill, followed by sweating.

On admission, the general condition was too poor for thorough examination. The abdomen was distended and generally tender. No masses were palpable. There were movable dulness and the suspicion of a fluid wave.

Operation was performed at once. The intestines were found adherent, and on gently separating them, foul-smelling sero-purulent fluid escaped. The appendix was gangrenous throughout. Part of the fluid was removed from the abdomen, and the accessible fibrin from the intestines. Drainage was instituted. The patient reacted poorly, grew somewhat better, but died rather suddenly and unexpectedly next morning, March 13th.

No autopsy.

It is not our usual custom to make any serious effort to remove all pus or fibrin in these cases.

Acute gangrenous appendicitis with sero-purulent peritonitis; probable portal pylephlebitis; appendicectomy and drainage; death.—A. C., male, aged 24, had never had a previous attack. Three days before admission there were general abdominal cramps which soon became localized to the right iliac fossa, where they persisted. Patient vomited twice shortly after the onset. Bowels moved only after active catharsis and enemata. The day before admission there was a severe chill lasting ten minutes.

On admission, November 2, 1905, the general condition was fair. The abdomen was distended; there was slight rigidity of the lower right rectus. There was no movable dulness. No mass was palpable, but some tenderness on deep pressure over McBurney's point. The spleen was palpable one finger below the free border, and very soft. Rectal examination was negative. W. B. C. was 12,500.

Operation on admission: Through a Kammerer incision, the abdomen was opened and some sero-purulent fluid escaped. The appendix was densely adherent over the pelvic brim. It was delivered into the wound and tied off; the mesenteriolum was thrombosed. The cecum was intensely inflamed and a perforation of its wall near the base of the appendix was sewn up and omentum sewn over it. The stump of the appendix was sutured to the lower angle of the wound. A cigarette drain was placed over the cecum. The appendix was 2½ inches long, acutely inflamed, its interior gangrenous.

After operation the temperature went up to 106° with a chill. On the second day the temperature had dropped to 101°; pulse was slow and irregular. There were several chills. A slight icterus developed. the liver dulness was enlarged upward and downward, the lower right intercostal spaces were tender and slightly edematous. Vomiting set in, which was frequently repeated and contained blood. The stools contained blood. Moderate oozing of blood from the wound began on the third day. These symptoms progressed, the pulse becoming slower and the patient stuporous. He died on the eighth day.

No post-mortem.

Gangrenous perforative appendicitis with general purulent peritonitis; appendicectomy and drainage; death.—Harry Kotler, age 7, admitted February 14, 1906. Three days before admission was suddenly seized with vomiting and general abdominal pain. Bowels moved only after catharsis. One day before admission pain became localized to umbilical region. Never had chills or sweats. There was general abdominal tenderness and peritoneal irritability, rigidity of both recti, more marked on right side, and movable dulness in both flanks. No mass could be felt. Rectal examination was negative.

On opening peritoneal cavity free purulent fluid was encountered. Appendix was non-adherent, gangrenous, with a small coprolith at

tip and a sharp, round perforation to its inner side. Appendix was removed and small rubber tube sutured into cecum through its stump. Abdominal wall closed by layer sutures.

Blood counts before operation showed white blood corpuscles 50,000 and 98% polynuclears. Patient died seven hours after operation.

Post-mortem: About 600 c.c., foul-smelling, sero-purulent fluid in general peritoneal cavity (Dr. Fried).

Gangrenous appendicitis; appendicectomy and drainage; death.—George P., aged 54, was admitted directly to operating room on April 20, 1906. On the day before admission the patient was seized with a severe attack of diarrhea and later had constant pain in right iliac fossa. No vomiting, no chill, no previous attack.

On physical examination his general condition was good. There was well marked rigidity and exquisite tenderness in right iliac fossa. Nothing palpable, no dulness in flanks.

An appendicectomy was performed with rubber tissue drain to bed of appendix. The appendix was retrocecal, firmly adherent and delivered into wound with difficulty. There was a slight amount of clear serous fluid in peritoneal cavity. Appendix was intensely congested, entire mucosa gangrenous and there was a hard fecal concretion in its lumen. On bacteriological examination the fluid from peritoneal cavity proved to be sterile (Dr. Jacobs).

On April 25th, at first dressing, there was profuse discharge from wound, general condition deteriorating. There was marked abdominal distention. Later in the day he became steadily worse, lips and fingertips were cyanosed. Abdominal distention increased, became dyspneic, eyes sunken, skin cold and clammy, temperature rose to 103.4°, and the patient died on the morning of April 26th, six days after operation.

Wound post-mortem showed absolutely no retention of secretion. Few coils of gut adjacent to incision drawn into wound, markedly distended; peritoneal coat dull and lusterless; in places a thin coat of fibrin.

Perforative gangrenous appendicitis; general purulent peritonitis; appendicectomy and drainage; death.—Aaron S., aet. 12; first attack of appendicitis started two days before admission with vomiting and general abdominal cramps. Bowels moved after cathartic. Patient had several chills. The next day vomiting became frequent and the patient was stuporous.

On admission, June 11th, the patient was in semi-stupor. Abdomen was rigid, generally tympanitic, generally tender, but especially in the region of the umbilicus.

Immediate operation. Kammerer incision. Pus escaped as soon as peritoneum was opened; packings inserted. Gangrenous appendix tied off and excised. Cigarette drain to the stump; abdomen closed about the drain.

After operation the temperature rapidly rose to 106.8° and the stupor deepened. Death occurred twenty-four hours later with symptoms of profound septicemia.

Chronic obliterative appendicitis; tumor of the ileo-cecal valve; appendicectomy; excision of a portion of the ileum and colon; ileo-colostomy; death.—Edward M., 45 years, was admitted on December 6th. Six years ago the patient began to have cramp-like pains in the abdomen. They were general, lasting a few minutes and then disappearing. About six months before admission there was an attack which lasted over twenty-four hours with vomiting and fever. Since that time he had about ten such attacks. For six weeks before admission, the pain was almost constant. The last attack, which occurred the day before admission, was very severe. An examination of the urine at that time showed it loaded with albumin, casts and white cells.

An examination of the abdomen revealed an indefinite tender mass over the appendix region.

On December 19th the appendicectomy, excision of a portion of the colon and ileum with end to end anastomosis, was done under gas and ether. A tumor was found to occupy the ileum and adjacent colon and the appendix was found ulcerated. A pathological report of the mass was "chronic inflammation and ulceration" (Dr. Mandlebaum).

After the operation, the patient presented signs of peritoneal sepsis and he was again taken to the operating room. A considerable amount of foul, bloody fluid was found in the peritoneal cavity. The pulse gradually grew more rapid and feeble, the temperature rising to 104°, and the patient died on the night of December 21st.

Acute gangrenous appendicitis; appendicectomy; cured.—Samuel X., 25 years, was admitted on January 2d. Two days before admission, patient had cramp-like pains in the epigastrium and radiating over the entire abdomen, finally becoming localized in the right iliac region. He vomited, had chilly sensations and fever. Since onset, he has been constipated.

Physical examination of the abdomen showed rigidity of the lower part of the right rectus muscle, and some tenderness on deep palpation. White blood cells were 8,000, differential—75% of neutrophiles.

On January 3d, appendicectomy without drainage was performed. The appendix and cecum were very much engorged and there was a

deposit of fibrin on the mesenteriolum of the appendix. Near the tip of the appendix was a small round area of beginning gangrene. The wound healed by primary union, and patient was discharged cured on January 13th.

Adeno-carcinoma of the appendix; appendicectomy; cure.—Pauline M., aged 20 years, was admitted December 11, 1904. For two years before admission had had several attacks, the symptoms of which were those of appendicitis. On admission there was slight tenderness in right iliac fossa.

On December 12th appendix was removed. Appendix was 1½ inches long, peritoneum pale, mucosa thickened. In the lumen of the appendix adherent to its wall by a broad base was a small fibrous tumor the size of a pea. Pathological report of this tumor was adeno-carcinoma (Dr. Mandlebaum).

Patient after a smooth convalescence was discharged cured December 27, 1904.

This patient was requested to show herself at the hospital every few months. The accidental "find" of adeno-carcinoma is an unusual one. Four or five others have been reported from this hospital. It is desirable to keep track of all of these patients.

Primary lymphosarcoma of the appendix with metastases; exploratory laparotomy; death.—J. M., male, aet. 27, entered the hospital September 30, 1905, with a three weeks' history of dull pain in the right iliac fossa, the appearance of an abdominal mass growing larger slowly, constipation, weakness with some loss of weight and fever.

On admission the general condition was fair. The superficial glands were moderately enlarged. There were signs of fluid in the right chest. The liver edge was felt three fingers below the free border; firm and rounded. There was a marked fulness occupying the whole right lower abdomen. On palpation there was a large, hard, irregular, ill-defined mass filling the right iliac fossa. By rectal several very large, firm glands were felt. Temperature was 101°.

An exploratory laparotomy was performed on October 4th, 1905, an intermuscular incision being made over the mass. The peritoneal cavity was packed off, the mass incised and a large amount of foul pus evacuated. The mass was gangrenous and necrotic as far as could be seen. Drains were inserted and the abdomen was closed about them.

Post-operatively the patient did not do well. Though the temperature dropped to normal and remained so and the wound drained well, the patient steadily lost ground. He died November 4th, 1905.

Post-mortem: Primary lymphosarcoma in the appendix and the

wall of the cecum. Metastases throughout small and large intestine. Large metastatic growths in the retroperitoneum. Metastases in the liver, bladder-wall, left adrenal, spleen, mediastinum and pericardium (Dr. Celler).

Acute gangrenous perforative appendicitis with general purulent peritonitis; appendicectomy and drainage; died.—Samuel S., 32 years, was admitted December 19th, 1905. Two days before admission he began to have severe cramp-like pains in the abdomen which soon became localized to the right iliac fossa. He had some fever and chilly sensations. He vomited twice the day before admission. Bowels were loose since the onset of the trouble. Temperature on admission was 101°, pulse 80, respirations 28. Examination gave marked rigidity of the right rectus. Exquisite tenderness at McBurney's point. There was movable dulness in the flanks.

On the day of admission, appendicectomy and drainage was performed. A localized abscess was found behind the appendix. At the tip was found a small patch of gangrene with a small perforation in the center of it. The patient reacted fairly well from the operation but began to fail that night. He died just as he was being removed to the operating room. At post-mortem, the whole pelvis was filled with foul smelling pus.

Gangrenous appendicitis; acute purulent peritonitis; appendicectomy and drainage; died.—Sam. W., 15 years old, was admitted January 15th, 1906. Four days before admission, he was seized with sudden abdominal pain which radiated over the entire abdomen. That same evening, he vomited. The following day, the pain became localized to the right iliac fossa. At time of admission, the pain had again become general. Bowels could only be moved with enemata. The only attack of vomiting was at the onset. On admission, the temperature was 108.8, pulse 104, and respiration 24. Physical examination of the abdomen showed marked rigidity. It was impossible to discover local tenderness or to palpate any mass. There was movable dulness in both flanks.

On January 15th, under gas and ether, appendicectomy and drainage was done. A cigarette and small packing to the stump were inserted. The appendix showed gangrene of the tip and a perforation. Although the patient seemed to react well, the temperature began to rise. On January 18th, after the first dressing, the patient's condition became worse, and on the following day an enterostomy under cocaine and Schleich was performed. The general condition again improved, the temperature still keeping up (102°) and the pulse rapid (110-120). On January 24th, the opening in the small intestine was closed. In the afternoon of that same day, the general condition

became worse—pulse 156 and small and the temperature 103.4°. Patient was taken to the operating room and intestine opened again. From that time on, the patient was kept up on stimulants, subcutaneous infusions and intravenous infusions. The pulse was 140-160 and the temperature rose to 106.2°. The patient died the morning of the 29th.

Acute gangrenous appendicitis; general peritonitis; appendicectomy with drainage; death.—P. G., male, aet. 14 years, was admitted September 11th, 1905. Five days before he had complained of sharp pains in the right iliac region. There was neither pain nor vomiting. Two days later pain became worse, fever set in and the patient vomited after taking food. The temperature ranged between 100° and 101°. The bowels were constipated but moved with cathartics and enemata. On the day of admission the pain had somewhat subsided.

Physical examination. The general condition was good. There was slight symmetrical distension of the abdomen with some movable dulness in both flanks and rigidity of the lower right rectus. At McBurney's point there was a distinct tender mass about the size of a plum. By rectum no mass but a high right resistance was noted. No albuminuria, but a few hyaline and granular casts. On admission the temperature was 102°, pulse 116, respiration 24.

The patient was operated upon immediately. Kammerer incision under gas and ether. Free serous fluid was present. The appendix removed by method of ligation and carbolic acid cauterization of stump. Abdomen closed with cigarette drainage.

Reaction was poor. Opium was given to control post-operative vomiting, but had to be stopped because respirations dropped to 10 on the third day. Bowels moved two days after operation after an enema. The septic condition progressed. The patient had involuntary urination and defecation toward the end. Death occurred on the fifth day following operation. No autopsy.

Gangrenous appendicitis with abscess; general purulent peritonitis; appendicectomy and drainage; death.—Harry L., aet. 25, gave no history of a previous attack. Three days before admission the present illness began with sharp, cramplike pain below and to the left of the umbilicus, radiating to the right side. Vomiting and chilly sensations were present. On admission, June 23d, the general condition was fair. There was some muscle rigidity but no tenderness and nothing abnormal palpable. Rectal examination was negative.

The next day the patient's condition became suddenly worse. The tongue became dry and there was frequent vomiting. Abdomen slightly distended; slight general rigidity and tenderness most

marked in the right lower quadrant. Slight movable dulness in the flanks. No mass to be felt by abdominal examination, but by rectal a large, soft, slightly tender mass could be made out to the right side and in front of the rectum.

Operation was then performed. Kammerer incision. General cavity contained purulent fluid. Localized abscess was found and emptied. The appendix was firmly bound down; was freed and removed. Wound partially closed.

Death two days later with symptoms of profound sepsis. No autopsy.

Appendicitis, abscess, general peritonitis; incision and drainage with counter incision for retro-colic abscess; death.—Mariano C., aged 40 years, was admitted December 12, 1905. Five years before admission had had an attack similar to the present one. Ten days before admission had vomited for seven hours; one day before, vomited. At times feverish. On the day of admission vomited twice, the vomitus being very foul, not projectile. No chill or chilly sensations. Bowels loose for six days, then absolute constipation.

On admission tongue was coated and dry; abdomen prominent, umbilicus pouting, veins dilated, tender all over, too much so for satisfactory palpation. Rigidity most marked in right iliac fossa, though general. Movable dulness was present.

On December 12th was operated upon and a mass (retro-colic) was found from liver to large pelvis. The mass was accidentally ruptured, and about ten to twelve ounces of sanious stinking pus escaped. This was mopped away. Counter incision made in right flank. Tube introduced for through and through drainage; another anteriorly into abscess cavity.

Culture from pus showed B. Coli.

On December 15th, after a rise of temperature to 106.8° the patient died.

HERNIA.

Whereas in former years the Bassini operation was the usual procedure in cases of inguinal hernia, in the past two years we have carried out the Halsted modification in more than half the cases; the conjoined tendon is sutured to Poupart's ligament over the cord, burying it. This simplifies the operation considerably, as it does away with all operative manipulation of the cord, thereby greatly diminishing traumatism of that structure, with the consequent troublesome post-operative exudates in the scrotum and testicle. So far the results have been quite as satisfactory as with the original Bassini

operation. Chromic cat-gut was regularly used for the deep sutures, plain cat-gut for the superficial fascia, and silk for the skin.

In the femoral hernias the regular procedure is still the suturing of Poupart's ligament to the pectineal fascia.

In cases with large hernial orifices, where it has not seemed feasible to bring together the edges of the fascia, we have repeatedly made use of the silver wire filigree with excellent results. Here, as in other cases of defect of the abdominal wall, the wire cable (silver) of Dr. Lilienthal has been found of value. It can be knotted and used otherwise as an ordinary suture.

Epigastric hernia; hernioplasty; cure.—Morris M., aged 21 years, was admitted December 12, 1904. About three years before admission had had dull pain in epigastrium. This had recurred and occasionally had radiated to the shoulder, to thighs and either testicle. Had never vomited. Had frequent headaches, worse at night.

On admission, pain fairly constant, worse at night and on deep inspiration; better on pressure. Pain was cramp-like in character, and felt as if it girdled the upper abdomen. The patient thought he was progressively losing flesh and strength. On admission, in the epigastric angle was a circular, elevated swelling about one-half inch in diameter, which did not move on respiration, was not adherent to overlying skin and which could be moved slightly in all directions, was doughy, smooth and tender. Seemed in front of recti.

On December 16th was operated upon and a mass of preperitoneal fat was exposed on incising the deep fascia. This mass was connected by a long, thin pedicle with the peritoneum. The peritoneum was opened, abdominal organs palpated and found normal. The pedicle was then ligated and mass removed. Abominal wall was then closed.

On December 26th the patient was discharged cured.

Ventral hernia; hernioplasty; cured.—Mr. Samuel G., 40 years, was admitted on November 7th. He was admitted on September 30th for appendicitis, for which he was operated upon. On October 3d he was again operated upon by enterostomy for peritonitis. Patient had a reducible epigastric traumatic hernia following the enterostomy. The patient was operated upon on November 8th under gas and ether for the hernia. The gut was closely adherent to the parietal peritoneum. Silver wire-cable sutures were used to fill up the space made by the excision of a portion of the fascia. The patient reacted well. Wound discharged a moderate amount until December 4th, and then closed entirely. The patient was discharged cured on December 8th.

Strangulated umbilical hernia; gangrene of intestine from volvulus; herniotomy; resection of small intestine; death.—Annie K., aged 50, was admitted November 30, 1904. For four years before admission had had umbilical hernia. At 12 M. on day of admission was attacked with severe pain in abdomen, hernia appeared and was irreducible. Vomited greenish material; bowels comparatively constipated, but passed flatus. Had chill lasting ten minutes. An irreducible umbilical hernia about the size of a child's head was found; the skin over the mass was glossy, and in one place, black. It was very tender and tympanitic.

On November 30th the patient was operated upon. The hernial sac contained bloody fluid with fecal odor. In the left half of the sac was an area of gangrenous small intestine with a thrombosed mesentery, and in the right half was adherent omentum. There was also gangrenous gut inside the abdomen. About 4½ feet of gangrenous small intestine were resected. The healthy ends were brought together with Murphy button, reinforced by a layer of continuous silk.

The patient's condition steadily became worse, and she died on December 2d.

Strangulated umbilical hernia; herniotomy and enterostomy; death.—Rifka K., aged 53, was admitted July 4, 1906. For eight years before admission had an umbilical hernia; wore a truss; hernia always apparently reducible. Four days before admission seized with burning pain in left half of abdomen; hernia became irreducible; vomited repeatedly; pain persisted until morning of admission; then a dark-brown, foul-smelling discharge was noticed coming from hernial mass, and pain subsided. An irreducible umbilical hernia, the size of a child's head was found; there was an area of gangrenous skin four inches square over it; perforated by a fistulous tract discharging fluid feces. Immediate operation; gangrenous skin excised; gangrenous loop of gut isolated; other loops of gut liberated from their adhesions and returned to abdominal cavity; gangrenous loop of gut packed off and a rubber catheter inserted into it and fastened in place with a single suture.

Patient died eight hours after operation.

Strangulated umbilical hernia; herniotomy; death.—Pauline L., 59 years old, came into the hospital November 30, 1904, with hernia, irreducible and apparently strangulated for four days.

She was operated upon at once, but promptly died.

Epigastric and inguinal hernia; hernioplasty; pneumonia; death.—Samuel S., aged 35, milk dealer, was admitted to the hospital August 8th, with a history of illness of four days' duration, which had

begun suddenly with cramp-like pain just below the ensiform, soon extending over the entire abdomen and persisting ever since. The bowels were obstinately constipated and the day before admission the patient vomited several times a bitter yellow material, foul-smelling, but not fecal.

On physical examination, a ventral hernia the size of a goose's egg was evident in a scar in the epigastrium, and in the left upper quadrant of the abdomen a distinct fulness could be seen. There was also a large, easily reducible left scrotal hernia.

On August 22d an operation was performed; the ventral hernia was exposed and the edges of the gap were brought together by fine silver wire sutures, and over these a fine silver wire filigree was placed and the skin sewed over all. A Halsted inguinal hernioplasty was then done.

On August 25th the patient died of pneumonia. No autopsy.

Strangulated femoral hernia; herniotomy; death.—Katie O., aged 54, was admitted January 1, 1905. For two years the patient had had a right inguinal hernia. Nineteen hours before admission (on December 31, 1904) sharp pain was felt in the right inguinal region, followed shortly by collapse. The hernia was reduced by an attending physician under anesthesia, but symptoms of intestinal obstruction came on. A pre-operative diagnosis of strangulated hernia reduced *en bloc* was made.

On January 1st herniotomy was performed, the injured gut being found in the pelvis. It was found necessary to resect about four feet of gut and an end to end anastomosis was made. The patient reacted fairly well, but in forty-eight hours there was a sudden change for the worse, and on January 3d, in spite of subcutaneous infusion, she died.

Strangulated femoral hernia; herniotomy; death.—Hinda F., aged 58, was admitted April 22, 1906. Had a left-sided hernia for fourteen years. Two days before admission patient had sudden cramp-like pains in left inguinal region and hernia became larger, tense, painful and tender. The day before admission she vomited frequently and was obstinately constipated. Her general condition was poor.

Physical examination showed a tense, rounded, elastic, tender and irreducible mass in left groin; was about the size of an orange; tympanitic on percussion, and overlying skin was red.

On day of admission operation was performed under local anesthesia. Condition was a strangulated femoral hernia, constriction being at Gimbernat's ligament. Four inches of gut and a piece of omentum 4″x3″ were found gangrenous. Omentum was resected; gan-

grenous loops were delivered into wound, ends tied together and protected by rubber dam. On April 25th loops of gangrenous gut were opened and drainage tubes were inserted into both extremities. The next day the general condition remained unchanged, but during the night the patient became steadily worse. Temperature rose to 104.8°, pulse became feeble and in spite of active stimulation patient died on April 27th, five days after operation.

Strangulated femoral hernia; herniotomy; resection of small intestine; enterostomy; death.—Betty W., aged 54, admitted directly to operating room, March 5th. A long incision made over a mass in right inguinal region extending from femoral ring 7″ up over the abdomen. Canal of Nuck opened and a hernial sac exposed, opened and found to contain about 2″ of gangrenous gut. Constriction at Gimbernat's ligament relieved, and 18″ of intestine containing the gangrenous portion, sidetracked by lateral anastomosis. In course of operation whole sidetracked loop turned black, necessitating its resection.

March 9th, abdomen extremely distended and enterostomy done. First loop of gut in wound opened and tubes inserted in either direction. After irrigation there was a free discharge of intestinal contents with relief of distension.

March 11th, after having been dressed and most of the packings removed, general condition became worse. An incision was made parallel to Poupart's ligament. The line of anastomosis was found partly broken down, peritoneal cavity was not entirely shut off and there were found free feces and gas in general peritoneal cavity. Line of anastomosis packed off, proximal end of gut sewn into wound and drainage tubes inserted into proximal and distal loops. Fifty cc. of 2% solution of a sodium salt of nucleinic acid injected into general peritoneal cavity. Condition during operation very poor: 30 cc. normal salt solution given intravenously during course of operation. Condition grew steadily worse and patient died three-quarters of an hour after operation.

Strangulated hernia (left side) herniotomy; secondary operation for acute obstruction; death.—Benjamin M., aged 34, was admitted February 7, 1905. Had been in hospital before and had been operated upon for Raynaud's disease with gangrene, amputation of both feet having been necessary. Had had an inguinal hernia since boyhood. Five hours before admission had severe pain in left inguinal region and hernia appeared. Vomited several times since. Pain steadily increased and became general and cramp-like in character.

On admission the patient's condition was fair; the pulse somewhat irregular but of sufficient force. In left inguinal region presented local signs of a strangulated hernia.

Herniotomy was performed without delay and the gut regaining a healthy color was returned to abdominal cavity. The patient vomited frequently after the operation, the vomitus containing both blood and bile. His condition became steadily worse, the pulse more rapid and feeble. There was considerable abdominal distension unrelieved by stomach washing or enemata.

On February 10th, acute obstruction being suspected, the wound was reopened and a constricting band found, this was cut and obstruction relieved, but the patient's vital forces had been too far spent, and he died in a few hours. No autopsy.

Hernia; strangulated inguinal; resection of intestine; enteroenterostomy (Murphy button); death.—Max R., aged 24 years, was admitted March 17, 1905. The patient had never known that he had a hernia until the present illness. Twenty-four hours before admission the hernia had appeared in the right inguinal region, with no apparent strain or other cause. Pain had been cramp-like and very severe. There had been vomiting, almost constant, and obstipation.

On admission the general condition was good. The patient was very well nourished. The abdomen was relaxed, very thick-walled and no movable dulness was found. A mass about the size of a goose egg was seen protruding from the right inguinal region. It was tense, very tender and tympanitic. No impulse on coughing.

Immediate operation was performed. The hernial sac was opened and the contained gut found to be dark and unhealthy in appearance. Irrigation with hot solution restored the apparent vitality of the greater portion. One small area remained dark and a large silk ligature was passed through the adjacent mesentery, the ends not knotted together. The intestine was then returned into the abdomen, the ends of the silk ligature being allowed to protrude at the wound.

Next day the patient's condition was so poor that the wound was again opened and the loop brought into view by the silk ligature. It was found to be gangrenous and 2¼ feet were resected, anastomosis being made by a Murphy button. Packings were placed about the anastomosis and the gut returned. The wound was packed. The patient reacted poorly. There was one short period of improvement, but on March 20th the condition grew rapidly worse and he died at 1.30 A. M., on March 21st. An intravenous injection of collargol solution was given without benefit.

Autopsy by Dr. Buerger showed the anastomosis perfectly sound. Some purulent fluid was found in the pelvis. The mesenteric stump was deeply congested but not thrombosed.

Strangulated inguinal hernia; herniotomy with exposed gangrenous gut; death.—Harris W., was admitted December 31, 1904. For sev-

enteen years before admission had had easily reducible inguinal hernia, for which had worn a truss. Twenty-four hours before admission, the patient not having worn his truss, the hernia became irreducible. Taxis by family physician unsuccessful. Patient vomited once the morning of admission; not since.

On admission, over right external inguinal ring was a tumor the size of a lemon, soft, no impulse on coughing, not reducible.

On December 31st herniotomy was performed and 1½" of gut was found gangrenous. The patient's condition was too poor to allow of resection of gut, so a tube was inserted into gut and the gut fixed to abdominal wall. Dry dressing.

On January 1st, at 3 A. M., the patient died.

Strangulated inguinal hernia; intestinal obstruction; herniotomy; death.—Kalmon W., aged 46, was admitted May 9, 1905. He had had an inguinal hernia for eight years. The hernia had been irreducible for thirty-six hours before admission. There had been neither vomiting nor chills. The abdomen was moderately distended and there was movable dulness in the flanks. In the right inguinal region was an elongated mass extending down into the scrotum. There was no impulse on coughing.

Soon after admission herniotomy was performed. A large sac was found containing much serous fluid, and a loop of small intestine, which was tightly constricted at the neck of the sac, and of such doubtful color that about eight inches were resected, anastomosis being performed with the aid of a Murphy button.

The patient reacted well and gave little anxiety for a few days, but on May 16th his condition became suddenly worse, and signs of peritonitis appeared. The abdomen was again opened and found to contain much free fluid. The gut was necrotic around the Murphy button and leaking. The button was at once removed and the two ends of intestine sutured into the wound and drained.

The patient reacted poorly, and in spite of active measures died on May 17th.

No autopsy.

Strangulated inguinal hernia; herniotomy; death.—Max B., aged 5 weeks, was admitted May 13, 1905. The child had been healthy until two weeks before admission, when it began to grow fretful and marked abdominal distention was noticed. The bowels had moved frequently after medication and there had been passage of flatus. The patient had frequently vomited for the first two or three days but did not seem to be in pain.

On admission there was marked cyanosis. The abdomen was much distended, tense and tympanitic. Nothing could be palpated. The

right side of the scrotum contained a hard mass, and above this, along the course of the inguinal canal, was a swelling, and manipulation of this mass caused gurgling.

Two days later the right inguinal canal was cut down upon and opened. The incision exposed also the cavity of the tunica vaginalis testis. A loop of intestine was found adherent to the testis in the bottom of the scrotum; the two sides of the loop were quite firmly united by bands of adhesions. The loop was freed and returned to the abdominal cavity. There was much free fluid in the hernial sac, and the gut above the obstruction caused by the acute angulation was distended. There was no gangrene.

The patient's condition grew very poor during operation and death occurred about eight hours later. No autopsy.

We were undoubtedly misled by what seemed to be an impulse and by the gurgling on manipulation. A more timely operation would probably have been successful.

Inguinal hernia; ulcerative colitis; proctitis and peritonitis; Bassini-Halsted operation; secondary celiotomy (colostomy); died.—Charles K., 30 years, was admitted on November 28, 1905. For about six months patient noticed small swelling in the right inguinal region. This proved to be a reducible inguinal hernia. On November 29th a Bassini-Halsted operation was performed. On December 4th, patient complained of severe abdominal pain. The pulse was very poor and he vomited several times a brown material which contained blood. The pulse at this time was 140, the respirations 44 and the temperature 100. A laparotomy was immediately performed. A volvulus of the sigmoid and peritonitis were found. A right inguinal colostomy was done. The pulse on the operating table became imperceptible. Even under the most rigorous stimulation the patient died that same evening.

Strangulated inguinal hernia reduced en bloc; laparotomy and reduction; acute general peritonitis; enterostomy; death.—Anton S., aged 64, was admitted April 13, 1906. Had a right inguinal hernia for 14 years. Ten days before admission patient began to have nausea which was followed by repeated vomiting of sour material. For 5 days before admission patient had no defecation in spite of enemata. Had occasional abdominal cramps. His general condition was poor.

Physical examination showed several coils of distended gut in active peristalsis, visible and palpable between umbilicus and symphysis. No localized tenderness, no mass and no rigidity. There was an indirect inguinal hernia on the right side which returned to abdomen as soon as patient lay down.

On April 15th an operation was performed through incision between fibers of right rectus. There was moderate intestinal distension. A loop of small intestine was caught in internal ring of a right inguinal hernia; the loop was removed after cutting constricting band, and though purple, the gut was viable. During the following two days the patient complained of severe abdominal cramps; enemata were given without effect. General condition became very poor and on April 17th temperature rose to 100° F. and there were signs of edema of the lungs.

On April 17th an operation was performed through original wound. There was found to be a beginning general peritonitis. A distended loop of small gut was opened with Dr. Lilienthal's instrument and stitched to wound. Enterostomy wound drained very poorly. General condition became steadily worse and patient died April 20th, three days after second operation.

Strangulated inguinal Richter's hernia; herniotomy and partial resection of intestine; cure.—C. G., male, aet. 41, had had a left-sided hernia for twenty years; this never gave symptoms and a truss was not worn. Four days before admission, while at work, the patient was seized with severe abdominal cramps. He vomited repeatedly all that day. Bowels moved that night after a cathartic but not since then. During the succeeding days the abdominal pains continued but less marked; the bowels did not move after repeated enemata; vomiting ceased.

On admission, October 16, 1905, there was a small, left inguinal hernia, somewhat tender, reducible in part. Percussion was tympanitic. The abdomen was held tense, was tender in the lower, left iliac region. There was slight moveable dulness in the flanks. The bowels moved with a high ox-gall enema.

At operation a few ounces of thin serum were found in the sac. Later, bloody fluid escaped directly from the peritoneal cavity. The constriction about a loop of gut was relieved, and at one point opposite the mesenteric border there was an area the size of a 25 cent piece which was black, with a rough, oozing surface, much thinned out and bulging. This area was resected and sutured over with a double layer of Lembert stitches; the suture line was dusted with iodoform powder. The intestine could not be reduced until the incision was enlarged. The gut near the suture line was anchored into the wound and surrounded by gauze packings.

Convalescence was uneventful. The highest post-operative rise of temperature was 100°. First dressing on the fifth day. Patient was discharged on the 22d day.

GENITO-URINARY DISEASES.

Enucleation of the hypertrophied prostate through a suprapubic wound and without perineal drainage continues to give the greatest satisfaction. When one considers the age and feebleness of most of these patients the enormous percentage of recoveries seems very remarkable.

The operation has been rendered still more safe by the frequent employment of the two-stage method.

Even in an exceedingly feeble individual the suprapubic incision for drainage of the bladder and for examination of its interior is followed by practically no shock whatever, the patient being allowed and even encouraged to get out of bed within twenty-four hours. This step of the operation can be easily performed under local anesthesia. In from 3 to 10 days the prostate may be enucleated under light general anesthesia in a very few minutes. The preliminary drainage of the bladder is of immense value aside from the importance of dividing the operation into two stages. Nothing can take the place of this form of drainage and intravesical operation with immediate suture of the bladder wound should be performed only in comparatively young and healthy individuals.

In the years before operations upon the prostate were so common we all remember the class of patients who, having been operated upon by the suprapubic method for calculus, were troubled for months or even years because the wound failed to close. Many of these patients could doubtless have been speedily relieved of their troubles by prostatectomy. In the case of Samuel B., (see history below), the prostate while not large, offered an obstacle just sufficient to make it easier for the urine to flow through the abnormal opening than through the natural channel. His very prompt recovery after the prostatectomy is most instructive.

Our X-ray department has given us the greatest aid in diagnosticating the presence of calculi in the ureters. In every case admitted for appendicitis in which there is the slightest possibility that the symptoms may be due to disease of the right ureter, the urine is centrifuged for blood and the radiographic plate carefully examined for suspicious shadows. It has more than once happened that a patient admitted for appendicitis has been cured by lithotomy of the ureter.

When the stone is situated low we have made the exposure retroperitoneally, through a wound parallel with Poupart's ligament and the iliac crest, the incision being made about ¾" toward the median line. This wound may be beautifully closed by the overlapping method, the resulting cicatrix being very firm and not likely to give rise to hernia.

When the X-ray has demonstrated the presence of a small calculus either in the pelvis of the kidney or in the ureter, operation is not indicated until diuresis by the ingestion of large quantities of water has been carefully tried. We have seen a number of cases in which this treatment was followed by the spontaneous passage of the stone with complete relief of symptoms.*

Cystoscopy is performed in every case of contemplated operation upon the kidney and catheterization of the ureters is systematically practiced in suitable cases.

Tuberculosis of vas deferens, testis and bladder; pyonephrosis; vasectomy; orchidectomy and perineal drainage of the bladder; nephrectomy; death.—B. B., aged 39, painter, was admitted to the hospital October 23, 1905. Ten years before there had been a mild traumatism of the left testicle; an abscess formed and several discharging sinuses developed, which persisted. About three and one-half years before admission hematuria began and continued, coming on in attacks with chills and fever. The urine was cloudy between the attacks of hematuria. A year later frequency of urination began, which had been slowly progressive.

On admission the general condition was fair. There were several discharging sinuses over the left scrotum and some healed tracts. The left epididymus and vas were thickened and nodular. The left seminal vesicle was enlarged. The patient reacted locally and systemically to tuberculin. The urine contained blood and pus; no tubercle bacilli.

On November 3, 1905, a left vasectomy and orchidectomy were done, that part of the scrotum occupied by sinuses being removed. Perineal drainage of the bladder was then established, almost pure pus coming out of the bladder.

The patient did fairly well after operation. A large mass occupying the right kidney region was becoming more definitely outlined, and operation was decided on. On November 17, 1905, a small left-

* The Non-operative Treatment of Renal or Ureteral Calculi Causing Colic. International Clinics, Vol. IV, 16th Series.

sided abdominal incision was made to determine the presence of the left kidney, cystoscopic attempts having been unsatisfactory. A right oblique lumbar incision was then made and a very large pyonephrosis was exposed. Attempts were made to remove the pus-kidney en masse, but it ruptured, discharging great quantities of foul pus. Adhesions were extremely dense. The pedicle was tied off en masse. Remaining fragments of kidney tissue were tied off in the same way. Mickulicz tampon-drain was used.

Post-operatively, the patient went into collapse, although there was no bleeding, and died in fourteen hours.

No post-mortem.

Pyonephrosis and ureteritis; nephrectomy; death.—Simon B., 32 years, was first admitted on July 20th with a questionable diagnosis of retroperitoneal tumor. For the past year he had noticed a mass in the right abdomen and had some slight pain in the epigastrium, which was dragging in character. During this time he lost about twenty-five pounds. On examination of the abdomen, a hard, irregular, nodular mass could be felt in the right lumbar region. A test meal taken on July 24th showed no free HCl, and a trace of lactic acid. On July 28th an exploratory laparotomy was done. Just below and to the inner side of the right kidney was found a sausage-shaped retroperitoneal mass, which extended down toward the pelvis. On account of the bleeding and the poor condition of the patient under anesthesia (chloroform), it was impossible to remove the tumor. Patient reacted poorly. The temperature, which had been normal, began to rise and the pulse became faster and irregular. The patient was transferred to the Medical side for observation and was again brought to the Surgical service on October 17th. He had left the hospital for a week and again returned for operative treatment. The mass in the meantime seemed to have grown somewhat smaller. On October 23d he complained of severe pain in the epigastrium and left lower chest and shooting pains in the legs. The temperature rose to 102.4, pulse 110-112, respirations 24. The following morning, Argyll-Robertson pupils, absent knee-jerks and Romberg's sign, were noted.

On October 25th an exploratory under gas, ether and chloroform was done. The mass about the kidney was found to be exudate and organized scar tissue. A needle inserted in the pelvis of the kidney revealed pus. A nephrectomy was performed for pyonephrosis. Pathological report on kidney (Dr. Mandlebaum), chronic interstitial inflammation and acute inflammation. A blood culture showed streptococci and a Gram negative bacillus. On November 16th a diagnosis of specific pseudo-tabes was made, for which mercurial inunctions were given. On December 2d, temperature rose to 105.2°, and patient had a chill. An examination of the urine showed a heavy

trace of albumin and urine loaded with pus cells. A blood count, 95% polynuclears. The patient developed fluid in the chest, twitchings of the extremities and stupor. Petechiæ were noted on the chest and back. The breathing became stertorous and the general condition became poorer, and finally, in spite of stimulation, the patient died on December 9th.

Vesical calculus; suprapubic cystotomy; cured.—Isaac M., 52 years, was admitted November 10th. Eighteen months before admission the patient experienced severe pain at the end of the penis on micturition. Since that time he urinated every two to three hours and always felt at the end of urination, as if he wanted to pass more. Only once during that time did he find blood in the urine. He was unable to hold his water for any considerable length of time. Many times he had incontinence. He never noticed any gravel, but often saw small white calcareous pieces. Pain on completion of micturition was increased when in the standing posture. He had been operated on for stone in the bladder about eight months before. A stone was removed, but his pain returned.

Suprapubic cystotomy was done under gas and ether on November 15th. An oval stone, about the size of a hazel nut, yellowish white, was removed. The patient reacted well and made an uninterrupted recovery, being discharged on December 19th.

Nephrolithiasis; (passed stone); cure.—Elias B., aged 56, was admitted July 3, 1905. Two years before patient had had an attack of pain in the right lumbar region, radiating to the groin, which lasted about ten days. During this time there had been no urinary disturbance. Two weeks before admission there had been severe pain in the right lumbar region, radiating down to the right groin, but not to penis or scrotum. No urinary disturbance nor changes in urine noted. The pain lasted eleven days, after which the patient thought he was urinating less frequently and in smaller amounts with pain at the end of the glans penis at the end of urination.

Physical examination was entirely negative. The urine was acid with a trace of albumin, few granular casts, some red blood cells and numerous pus cells. Total for twenty-four hours about forty ounces, all strained. Temperature, pulse and respiration normal.

On July 5th the patient passed a stone per urethram, about 1x.5 cm., irregularly oval in shape. On July 6th the patient was discharged cured.

(1) *Perinephric abscess;* (2) *pyelitis with obstruction of right ureter; incision and drainage; secondary nephrotomy and exploration of ureter.* (*1*) *Cure;* (*2*) *improvement.*—Edward S., aged 12 years, was admitted —. Three days before admission patient suddenly had

become ill with symptoms of severe general infection together with pain localized in the right iliac fossa.

On admission showed signs of meningeal irritation, had a coated tongue and marked tenderness in the right iliac fossa. White blood cells 20,000. One week after admission the meningeal signs had disappeared, the tenderness at first in the right iliac fossa became localized in the right lumbar region, where a large fluctuating mass was palpable, and where there was flatness on percussion below the free costal border. The temperature was between 100° and 103° through the week. White blood cells had risen to 32,000. The urine contained macro- and microscopic pus with some red cells.

On October 11th incision of this subphrenic retroperitoneal abscess was performed and a large amount of thick grumous pus was evacuated. Pathological report on pus showed staphylococcus aureus.

On October 27th a profuse urinous discharge came from the wound and urine per vias naturales was loaded with pus.

November 16: An exploratory nephrotomy revealed a large kidney densely adherent at its upper pole. An opening was found in the ureter about an inch below the kidney; a probe went in five inches. Methylen blue injected and patient catheterized. No bluish discoloration of urine. Passed catheter though sinus into pelvis of kidney after having dilated with dressing forceps. A tube was left in the kidney and another in the lower part of the ureter. Packings about tubes. Dry dressing.

November 21st: Packings removed; methylene blue injected. Urine was passed two hours later colored blue.

December 8th: Tubes were removed, sinuses being found closed.

On December 26th, after a long convalescence, the patient was discharged cured of his perinephric abscess and with his ureteral obstruction improved. A few days after discharge a calculus was passed.

May 21, 1905. Patient perfectly well to date.

Pyonephrosis; nephrotomy; ureteral calculi; ureterotomy; cure.—Otto N., age 19, was admitted March 17, 1906. Four weeks before he began to have sticking pains in left lumbar region; during the week before admission the pain moderated considerably. Has had several heavy night sweats.

Physical examination showed an indistinct, rounded, ballotable mass in the left lumbar region. Mass was slightly tender on firm pressure, and when squeezed it caused pain which radiated down to groin. Urine contained plus albumin and many pus cells. Blood count was normal; no tuberculin reaction. X-ray showed indistinct shadow in left lumbar region.

On March 21st a nephrotomy was performed and about one ounce

of yellow pus evacuated. A large friable calculus was present at junction of pelvis and ureter; it was removed, except for a piece which broke off. On account of bleeding, operation was stopped and wound packed. The calculus proved to be almost entirely magnesium and ammonium phosphate with a trace of calcium phosphate. Pus from pyonephrosis was sterile and contained no tubercle bacilli.

Patient did well after operation. X-ray on March 27th and 28th showed a calculus in ureter near bladder. On April 4th a ureterotomy was performed, the ureter having been exposed retroperitoneally and a calculus 2½x½″ was removed from ureter near bladder. Ureter was closed by Lembert sutures of fine chromicized catgut. Abdominal wound overlapped and sutured with single small drain to ureter. Patient made an uninterrupted recovery and was discharged cured April 28, 1906, twenty-four days after secondary operation.

Renal calculus; gonorrheal vulvo-vaginitis and urethritis; nephrotomy and drainage; death.—Cecelia K., age 23 years, admitted February 22d. Had a number of attacks of pain in right side radiating to back and right arm, nausea, vomiting, burning on micturition with red urine. Her doctor told her, during one of these attacks, that she was jaundiced.

Physical examination negative, except for palpable right kidney and thick, yellow, muco-purulent vaginal discharge, in which gonococci could be demonstrated. Radiograph plate showed a calculus in pelvis of right kidney.

At operation the usual lumbar incision was made. Gall-bladder palpated and found normal, through a small incision in peritoneum, which was immediately closed. Pelvis of kidney opened and two small and two large calculi removed, which on examination later were found to be principally cystin with some calcium and magnesium phosphates.

Condition after operation was good. On March 5th condition became poor, vomited several times, pulse became weak, irregular and very slow and patient died in spite of active stimulation, artificial respiration. Massage of heart through incision in chest practiced immediately after death.

Pyonephrosis; ureteral calculi; nephrotomy and drainage; cure.—Annie B., aged 26 years, was admitted March 31, 1905. The patient had had chronic cystitis for about four years. Ten weeks before admission, in January, 1905, she had begun to suffer with severe pains in the right lumbar region, and radiated downward. Hematuria appeared, but ceased in a few days. Pains in the right lumbar region became much more severe, and the patient began to run septic temperatures ranging between 99° and 104°. On one occasion there

had been almost complete anuria for twenty-four hours, and at that time a mass was detected in the right renal region. Shortly afterwards there was relief following a profuse flow of urine, and the mass disappeared. The symptoms, however, returned and the patient entered the hospital for relief. Chilly sensations and nausea had been frequent. The urine on admission was alkaline and contained a large number of pus cells. The general condition was fair. In the right lumbar region was felt a mass the size of a grapefruit; slightly irregular, fairly firm and not moving with respiration.

On April 5th nephrotomy was performed. Pus was found on aspiration. The kidney was incised and much pus evacuated, together with a small stone; a larger one was removed from the upper end of the ureter. A ureteral catheter was readily passed into the bladder. Drainage. The discharge from the wound continued purulent for some days, then became urinous and had ceased entirely when the patient was discharged on May 4th, with a superficial sinus. The urine contained many pus cells up to the time of discharge and was still alkaline, but the general condition was very greatly improved. [Some weeks afterward patient was seen. She then considered herself perfectly well.]

Purulent nephritis; nephrotomy and drainage; cure.—Lizzie H., age 26 years, was admitted on January 9, 1905. Father had died of nephritis.

Patient had had measles and diphtheria in childhood. Had had no nephritic symptoms. For seven months before admission had had sharp pains in both lumbar regions radiating around upper abdomen to epigastrium. These pains had become steadily worse. Ten days before admission had had a chill, felt feverish and vomited. Eight days before admission had had a dull pain in epigastrium with severe pain over left lumbar region. Vomited for last time four days before entering the hospital.

On admission, in the left hypochondrium, an irregular, oval, firm and tender mass not moving with respiration, was found. The urine contained very many pus cells and some red blood cells, but no pus casts. White blood count showed 23,000 with 83% polynuclears.

On January 11th nephrotomy was performed. The kidney was found three times normal size. Incision was made down to pelvis. Drainage tube inserted into pelvis of kidney with piece of white gauze.

Microscopical examination of a section of the kidney showed purulent nephritis (Dr. Mandlebaum).

On January 28th tube was permanently removed. There was a moderate flow of urine from wound. Dry dressings applied.

On February 11th the discharge from wound having been absent for about a week, the patient was discharged cured.

Urethral calculus; external urethrotomy; cure.—Frank Levy, aged 7 years, transferred from service of Dr. Koplik February 9, 1906. Eight days before admission patient experienced pain at end of glans penis during micturition, with passage of a few drops of bright blood at beginning and end of act. There was no change in force or character of stream, no chills, fever or vomiting. Since birth he had had enuresis, which ceased at onset of this illness and there was diminished urination.

The meatus was swollen and the lips glued. There was slight urethral discharge and an exquisitely tender mass could be felt in urethra at peno-scrotal angle. A calculus was shown in this situation on a radiograph plate and a sound in urethra elicited grating 1½ inches from meatus. There was tenderness on pressure over the bladder.

Urethra was isolated through a small perineal incision, incised and calculus extracted, after which wound was packed. After ten days urine was passed per urethram. Discharged cured February 24th.

Pyelitis; nephrotomy (right side); death.—Kate H., aged 30 years, was admitted January 2, 1905, discharged January 31st, and readmitted February 10th. Eight days before her first admission had had an attack of renal colic. On admission right kidney was found enlarged and tender. X-ray was negative. Urine was alkaline and contained very many pus cells. Up to January 19th patient had had a number of attacks of renal colic, but the temperature had always been normal as well as the pulse. Several of the attacks disappeared ten minutes after the administration of distilled water hypodermatically.

On January 31st patient was discharged improved, but readmitted February 10th with a history of similar attacks of pain as were present during previous stay in hospital.

On February 14th an exploratory nephrotomy was performed on the right side. The kidney and ureter were searched, but nothing was found. Pathological examination of piece of kidney showed chronic interstitial nephritis with slight acute degeneration (Dr. Mandlebaum). The kidney wound was packed. After operation the general condition became very poor. Complete anuria gradually developed with all the symptoms of uremia. In spite of all treatment the symptoms steadily became worse, and the patient died on February 11th.

Wound examination showed chronic pyelitis and chronic degeneration of the liver (Dr. Libman).

Here a simple nephrotomy for pyelitis resulted fatally. It is very probable that the hepatic degeneration had something to do with the speedy onset of the uremia in some way which the physiologists have not yet explained. The exploratory nephrotomy was clearly indicated.

Renal calculi; reflex anuria; double nephrotomy; death.—Hannah B., aged 45 years, was admitted January 28, 1905. For two weeks before admission had had a dull pain in right flank; during this time urine steadily diminished in quantity and there were progressive symptoms of uremia. On the day of admission the patient passed only one ounce of urine. In the left hypochondrium there was felt a large smooth mass which moved with respiration and was not tender. Right hypochondrium was slightly tender to pressure.

On January 30th the anuria persisting and the signs of uremia increasing, double nephrotomy was performed. Many calculi were removed from the right kidney, parenchyma and pelvis, after which kidney wound was packed with gauze. On the left side there were no stones, but a large congested kidney.

For about thirty-six hours after operation the patient seemed slightly improved, the kidney dressings were soaked with urinous discharge; more urine was obtained from the bladder and the signs of uremia were less marked, but from that time till death, which occurred four days after operation, the signs of uremia increased and practically no urine was excreted.

Wound post-mortem showed a right kidney which was small and disorganized, containing many small, encapsulated stones. The ureter appeared normal. No stones were found in the left kidney, which was about one and one-half times the normal size and markedly congested. No ureteral obstruction. The bladder was not abnormal. (Dr. Libman.)

Renal calculus; no operation; cure.—Simon, aged 21, was admitted February 14, 1905. Had had four attacks of renal colic before admission, the last two, eight weeks and eight days before, respectively. Each attack had been more severe than the previous one. On admission, physical examination was negative. On February 17th was cystoscoped and ureters catheterized. Results were negative; both specimens of urine were dark and turbid, with bloody precipitate. February 27th a rough stone about the size of a bean was spontaneously passed. Pathological examination of stone showed that it contained lime and magnesia as carbonates, and phosphates, mostly phosphates of calcium. (Dr. Bookman.)

On February 27th the patient was discharged, cured of present attack.

The only treatment directed to the relief of the trouble was the ingestion of large quantities of water.

Hypertrophy of the prostate; suprapubic prostatectomy in two stages; cure.—Mr. M. was admitted January 10, 1905. For six years before admission had been suffering with all the symptoms of an enlarged prostate; most of this time had been leading a catheter life.

Two days before admission about eight ounces of urine, tinged with blood were removed by catheter. From this time on had to be catheterized every three hours; each time the urine was a deeper red, until finally, on day of admission, catheterization withdrew what seemed to be a few ounces of pure blood.

On January 10th cystotomy was performed and a large clot of blood was removed from the bladder. A small, bleeding vein was found on the surface of the enlarged median lobe of the prostate. It was impossible to check this bleeding by the actual cautery so the bladder was tightly packed. During the following three days, though the patient suffered a great deal of pain, the dressings were only lightly stained with blood, though soaked with urine.

On January 13th, the patient having recovered sufficient strength, a suprapubic prostatectomy was performed. The prostate was very much enlarged, especially the median lobe. Pathological report was adenoma (Dr. Mandlebaum). No urethral mucous membrane was found in specimen. Usual method of tube drainage employed.

After operation the patient's general condition steadily improved until January 30th, when he had a chill and rise of temperature due to collection of pus in prostatic fossa; this was massaged, and in a few days patient's condition again began to improve. In about a week the prostatic induration had almost disappeared. Tube now removed from suprapubic opening, and from this time on the patient had an uninterrupted recovery until on February 23d he was discharged cured. On February 20th urine no longer came from suprapubic incision.

Hypertrophy of prostate; suprapubic prostatectomy; cure.—Charles B., an aged man, was admitted February 19, 1905. There had been the usual prostatic history of frequent micturition, often with difficulty and a burning sensation. These symptoms had been growing progressively worse.

On February 20th suprapubic prostatectomy was performed. The gland was recovered entire with some difficulty. The upper and lower angles of the bladder wound were brought together by running sutures, which were left in place. The removed gland showed no mucous membrane although the urethral opening ran through its center.

On February 23d the bladder wound was entirely closed by sutures and a permanent soft catheter introduced. Convalescence was rapid. For a day or two only, there was slight epididymitis on the left side. The patient was discharged on March 20th with a superficial granulating wound. Capacity of bladder (comfortable) eight ounces; stream good. Cured.

Hypertrophy of prostate; suprapubic prostatectomy; death.—Oscar

W., aged 50, was admitted February 7, 1905. For one year previous to admission there had been pronounced symptoms of an enlarged prostate. On admission the patient had enlarged prostate.

On February 10th, suprapubic prostatectomy was performed in the usual way. There being very slight hemorrhage from bladder it was at once closed by suture and the abdominal wall also closed. Large catheter left in bladder.

On February 12th symptoms of uremia gradually made their appearance and steadily increased till on February 14th the patient succumbed.

Autopsy showed that there was no hemorrhage into the bladder and no infection about prostatic wound; no peritonitis. Kidneys were the seat of parenchymatous nephritis, the capsules stripping off without loss of kidney substance (Dr. Libman).

Prostatic hypertrophy; suprapubic prostatectomy; cure.—Leopold F., aged 68 years, was admitted April 30, 1905. The patient gave a history of frequency and difficulty of urination for six months. First attack of complete retention twenty-four hours before admission. Several unsuccessful attempts at catheterization were made. The bladder was finally entered with a metal instrument. Subsequent catheterization had been done with rubber catheters. Chief complaint—retention of urine.

On admission the general condition was good. By rectum the lateral lobes of the prostate were found slightly enlarged, but not tender.

May 3d suprapubic prostatectomy was performed. Bleeding was slight and controlled by packing. The tube drain was removed in eleven days, and after a normal convalescence the patient was discharged cured on May 28th. The wound leaked slightly at that time. The prostate removed weighed 163 grammes.

Vesical calculus; prostatic hypertrophy; suprapubic lithotomy and prostatectomy; cure.—Samuel M., aged 55, was admitted November 14, 1905. For one year before admission had suffered the symptoms of enlarged prostate and vesical calculus. The symptoms had steadily become more marked and patient had lost weight and strength.

On admission, per rectal examination, was found a moderately enlarged prostate; just above this could be felt a smooth, round, slightly movable, hard mass, which on being pressed, caused pain at the end of the penis (vesical calculus).

On November 18, 1904, the patient was operated upon and three stones about the size of an almond were removed with forceps. The prostate was then palpated, found enlarged and accordingly removed

Gauze packing to bed of prostate and packing in bladder. The prostate was about the size of a walnut with middle lobe moderately enlarged.

Pathological report. No urethal mucous membrane in prostate (Dr. Mandlebaum).

November 19th: Bladder packings were removed, except the one in prostatic cavity. Bladder irrigated; tube drainage begun.

November 21st: Packing removed from prostatic cavity. Continuous drainage with siphonage and vacuum created with use of T tubes. Bladder irrigated three times a day.

November 29th: Tube drainage stopped. To be catheterized every three hours.

December 2d: Prostate massaged. Suprapubic wound strapped.

December 5th: Patient passed urine through urethra.

December 13th: No leakage through suprapubic wound.

December 20th: Patient was discharged cured, being able to urinate through urethra and there being no urinary discharge from suprapubic wound which was almost healed.

Note: May 21, 1906. Patient is perfectly well. Sexual power good. No residual urine.

Vesical calculi; hypertrophy of prostate; suprapubic prostatectomy; secondary prostatectomy; cure.—Samuel B., aged 56 years, admitted November 23, 1905. For three years patient had had pain at end of penis during micturition, increased frequency but never retention of urine. Once, about two years before admission, he noticed blood in the urine.

On examination patient has marked arterio-sclerosis. His prostate is large, firm, hard and tender, merging above with a still harder mass. Physical examination otherwise negative.

On November 24, 1905, suprapubic cystotomy and drainage. Twelve large oval stones varying from size of almond to that of hazel-nut removed.

On December 27th, when suprapubic wound had almost closed, it was enlarged downward and two lateral lobes with a portion of median lobe of prostate removed.

Siphon drainage of bladder after both operations. Wound healed without complications. Discharged cured February 1st, 1906.

Prostatic hypertrophy; suprapubic prostatectomy; cure.—I. H., aet. 60, had always been well except for an attack of gonorrhea in youth. There had never been any urinary symptoms until two weeks before admission. Then the patient began having very great difficulty in urination, great frequency and burning pain. Frequent catheterization became necessary.

On admission, September 14, 1905, patient's mentality was poor. The physical examination showed general arterio-sclerosis. The tongue was dry. Respiration jerky, slightly accelerated; pulse high tension. On rectal examination a large, hard prostate was felt. The urine was full of pus and red cells. For two days the patient was catheterized and the bladder was irrigated.

Operation, September 16th, under gas anesthesia, bladder inflated, two inch suprapubic incision, peritoneum pushed up, bladder incised, capsule of prostate split and the gland shelled out. Two pieces of gauze were used for drainage; one for the cavity left by the prostate, the other for the interior of the bladder.

Post-operative. On September 19th, drains removed, tube inserted and daily irrigations of the bladder begun. On September 24th wound was clean and granulating; it was lightly drained with gauze. On October 5th patient began voiding voluntarily. On October 16th wound remained dry for 12 hours, urination painless and perfectly controlled. Patient was discharged November 1st. The wound had healed. Patient could hold his urine for about four hours. There was no residual urine. The urine passed was almost clear.

Fibroadenoma of the prostate gland; suprapubic prostatectomy and drainage; death.—A. P., aet. 70, was admitted November 22, 1905, complaining that for more than a month there was almost complete inability to urinate and that catheterization was becoming progressively more difficult.

On examination, the patient was well nourished. The prostate was enlarged to the size of a quince, firm and tender. The urine showed cystitis.

Operation, November 24, 1905. The prostate was removed in two pieces. The interior of the bladder, especially the prostatic bed, was packed with gauze. After operation the condition was fair. The patient suddenly died on the second day after operation. No post-mortem.

Incontinence of urine following prostatectomy; urethroplasty; cure.—W. C., aet. 59, had had a suprapubic prostatectomy performed on him two years before. Since the operation there has been no control over the bladder, the urine constantly dribbling.

At reoperation, October 20, 1905, a median perineal incision was made. The urethra was isolated with a sound in situ. The sound was withdrawn and the urethra divided transversely. The upper end was held with artery forceps. The lower (posterior) end was grasped, twisted 180° on itself and held in this position by silk sutures fixing it to the triangular ligament. The cut ends were then united by silk sutures outside the mucous membrane. A Mercier catheter was passed; the perineal wound was packed.

On the second post-operative day on account of the plugging of the catheter it had to be removed. A small opening was made through the perineal wound into the urethra behind the suture line and a soft rubber catheter was introduced into the bladder through this opening. After this the anterior urethra was frequently irrigated, and the patient began voiding voluntarily on the third day after the second operation. Patient discharged November 6th, the bladder holding about 3½ ounces. The patient could empty it completely and could urinate or hold his urine at will.

(The symptoms relapsed soon after discharge. See following histories.)

Incontinence of urine due to paralysis of vesical sphincter; circular constriction of urethra by silver wire; cure.—Wolf C., aged 59 years, admitted January 30, 1906. Three months before admission a Gersung operation was done at this hospital for urinary incontinence following suprapubic prostatectomy. Patient had good control until a month before admission when he again had complete incontinence.

Urethra was isolated, medium sized catheter passed into bladder and a loop of silver wire cable passed around it and tightened. The morning after operation the catheter was removed and patient since then has been able to start and stop urinary stream voluntarily with very little dribbling.

February 16th discharged cured. To return for observation.

Senile hypertrophy of the prostate; suprapubic prostatectomy; died.—Sussman S., 80 years, was admitted January 23d. Three weeks before admission patient had difficulty in passing his urine and had to be catheterized. Since that time he noticed blood in his urine. There was slight pain on urination, but he only had to be catheterized three times since the beginning of the trouble. For several years he had noticed that the stream of urine had been forked. On examination, the prostate was found to be moderately enlarged.

On January 24th suprapubic prostatectomy was performed under chloroform. A rubber tube was inserted for drainage.

After the operation the patient became decidedly worse and was kept alive by subcutaneous infusions and stimulants, which were given frequently. The temperature had been normal before the operation, but then arose to 100.8°. The pulse became more rapid and weaker, and the patient died on January 27th.

Hypertrophied prostate; suprapubic prostatectomy; cure.—Stephen L., age 71, admitted January 7, 1906. About three years before admission patient noticed urinary urging and frequency. He never had difficulty in starting stream, painful micturition or

sudden interruption in stream. Urine was always clear without blood or gravel until about one month before admission, when it became cloudy, malodorous and coagulated into jelly-like consistency on standing. For about eighteen months before admission the patient was catheterized every six hours, having been unable to urinate at all.

On January 9th prostate was removed by suprapubic route. After operation condition became poor, but patient rallied after vigorous stimulation.

January 10th, continuous tube drainage of bladder was established.

January 11th, packings to bed of prostate removed.

January 28th, tube drain was removed and wound strapped. Several concretions were passed. On March 4th cystoscopy failed to show the presence of any concretions. Residual urine decreased in amount from 200 cc. to 90 cc. Patient discharged cured March 10th.

Prostatic hypertrophy; vesical calculi; suprapubic prostatectomy with removal of vesical calculi; cure.—John L., aged 66 years, was admitted November 8, 1904. For eight years before admission had been suffering from painful and frequent micturition, which for a few years before admission had necessitated a catheter life.

On admission the prostate was found very much enlarged and slightly tender. Enlargement was confined to the lateral lobes.

On November 9th the prostate was removed suprapubically in the usual way. Two large calculi were found in the bladder; one the size of a small cherry was found firmly embedded in the wall of the bladder near the fundus. This was removed with great difficulty with a sharp spoon. It would have been impossible to remove it through a perineal incision.

On November 11th secondary suture of bladder wall and abdominal wall. A permanent catheter inserted through urethra into bladder.

November 29th. A large permanent catheter was inserted after the bladder, urethra and suprapubic opening had been thoroughly irrigated.

December 3d: The permanent catheter was removed.

December 5th: Patient began to pass urine through urethra.

December 21st: No more urine came from suprapubic wound.

December 24th: The patient was discharged cured.

Hypertrophy of prostate; suprapubic prostatectomy; cure.—Benjamin B., aged 77, was admitted February 13, 1905. He had had the usual symptoms of prostatic hypertrophy—moderate frequency of micturition with some burning during the act, more marked within a week before admission. At times there had been delay in starting the stream, and it was not as full as formerly. Three days before

admission there was retention of fifty ounces. Residual about thirty-five ounces at time of admission. There was very little cystitis. Catheterization was painful and gave rise to slight bleeding.

On February 14th suprapubic prostatectomy was performed. The patient reacted well. Convalescence was somewhat interrupted by a right-sided epididymo-orchitis, but this subsided and he was discharged on March 13th with urination normal, urine clearing up and some swelling of testis.

The patient was seen on October 20th and found to be in excellent condition. The urine still slightly turbid, but no symptoms. Erections strong.

Hypertrophy of prostate; vesical calculus; suprapubic prostatectomy; death.—Charles H., aged 64 years, was admitted January 28, 1905. He had had the usual prostatic history for about four years. Had not been using a catheter.

On January 30th suprapubic prostatectomy was performed. The patient reacted poorly. On January 31st he suddenly began to gasp for breath and became cyanotic. In spite of stimulation and artificial respiration he died that afternoon.

Cause of death probably cerebral embolism. Autopsy refused.

Prostatic hypertrophy; granular cystitis; suprapubic prostatectomy; cured.—Sigmund C., aged 49 years, admitted February 14, 1906. Two years before admission patient had an attack of dribbling of urine without blood or sediment, which lasted two weeks. Seven weeks before admission began to suffer pain at end of penis before urination; there was a constant desire to micturate, and stream was often interrupted. Never saw blood or gravel in urine.

On February 14th a preliminary suprapubic cystotomy was performed and two days later a small prostate firmly adherent to rectum, was partially removed. Bladder mucous membrane was found congested, thickened and granular. Wound closed with exception of tube drain into bladder, which was finally removed March 2d. Discharged cured March 7th.

Later observation showed that patient suffered no pain on micturition, no hematuria, and that he could hold his urine for three hours without difficulty.

Calculus in the pelvic ureter; ureterotomy and removal of calculus; cured.—Samuel L., admitted January 24, 1906. Operated January 31, 1906. Discharged February 16, 1906.

Case reported in *International Journal of Surgery* for March, 1906.

FEMALE GENITALS.

Of the fifty-seven operations on the female genitals, the following five are of interest:

Twisted ovarian dermoid cyst; appendicitis; right salpingo-oöphorectomy; appendicectomy; death.—R. M., female, aged 7 years, admitted September 14, 1905. The night before admission the patient had an attack of sharp, paroxysmal pains in the umbilical region, associated with nausea and vomiting and slight fever. No chill or chilly sensations.

The patient was operated upon immediately after admission. Under chloroform anesthesia a 1½″ McBurney incision was made. On opening the abdomen free, bloody fluid escaped. Appendicectomy was performed. Further exploration revealed a tumor in the pelvis which could not be brought out through the incision. The incision was closed by layer suture and a median incision 2½″ long made. A gangrenous tense tumor in the right pelvis proved to be an ovarian dermoid. The pedicle at the uterine insertion was twisted about one complete turn. The tumor was removed and the wound closed by layer suture. The appendix was 1½″ long; peritoneum markedly injected; mucosa thickened. The cyst was 1½″ in diameter, completely gangrenous. On section it proved to be a dermoid. The patient reacted fairly well, but the pulse remained rapid. The next morning the patient went into collapse. The abdomen was opened, but no bleeding found. Death followed soon afterward.

Ovarian abscess; rectal fistula; chronic sepsis; extirpation of right appendages; drainage; death.—Helen P., aged 20 years, was admitted January 5, 1905. About three months before, in October, 1904, the patient had begun to suffer with sharp pains in the right abdomen, low down. She had had no chills and very slight fever, if any, but felt weak and sick and had lost about eighteen pounds in weight during the three months.

The patient was poorly nourished, but in fair condition. The abdomen was prominent in the lower half, especially on the right side. It was generally tender, especially so in the hypogastric and right inguinal regions. In the right iliac fossa a large, soft, tender mass was palpable. It was also felt by rectum.

On January 5th the right ovary and tube were removed. They were found to be enclosed in a mass of adhesion about twice the size of a fist. An abscess cavity was in the center of the mass, the wall of which was very fragile and came away in pieces. As much as possible was removed. The patient's condition grew very poor upon the table and active stimulation and an intravenous infusion were resorted to. A cigarette drain, with several packings, was introduced into the abscess cavity, and the wound closed around it.

After operation there was a distinct improvement for a week, but the patient began to run a septic temperature and the discharge from the wound, which was quite profuse and very foul, did not diminish.

On February 11th an opening was made through the rectum and a drainage tube pulled into it from the abdominal wound. Little improvement followed, and on February 17th, incision, with drainage, was done for a large pelvic abscess, through the rectum. The discharge from the rectal sinus was very foul. Some still escaped through the abdominal wound. The patient began to lose weight and strength steadily in spite of careful feeding and stimulation. She grew worse and died on March 23d from exhaustion. She was greatly emaciated.

Unfortunately no autopsy was obtainable.

Chronic salpingitis; left salpingo-oöphorectomy; death.—Mamie S., aged —, was admitted January 2, 1905. Ten months before admission a glass douche point was broken in the vagina. Much was removed at the time, but the patient thought not all. Had had pain localized in left pelvis ever since, which was increasing in severity. On admission a thickened left tube and ovary were palpable.

On January 3d an attempt was made to remove the diseased organs through the vagina, but this was abandoned. The base of the bladder was injured and repaired. Abdominal section with salpingo-oöphorectomy was then made. The patient did not do well and the next day showed signs of internal hemorrhage. The wound was again opened, but very little bleeding could be found. She again reacted poorly and grew gradually weaker, dying on January 5th. No autopsy.

Gonorrheal tubo-ovarian abscess; gonorrheal arthritis of terminal phalangeal joint of finger; resection of phalangeal joint; salpingo-oöphorectomy; cure.—Rosie K., aged 16 years, was admitted January 3, 1905. In December, 1904, the patient had begun to suffer with severe, sharp pains in the right iliac region. The pain became general over the abdomen and vomiting was constant.

The patient was admitted to the Surgical side on January 3d. Vaginal examination showed only a prolapsed ovary upon the right side. The entire lower abdomen was tender on palpation. On January 4th cystoscopy was done with catheterization of the right ureter only. Under anesthesia, bimanual palpation showed a mass upon the right side. This was aspirated and pus obtained, which showed the presence of gonococci.

Arthritis of the middle and last phalanges of the third finger of the right hand set in, and on January 13th arthrectomy was performed. The joint surfaces were entirely disintegrated. The diseased

cartilages were removed and the finger put up in extension. A culture showed gonococci in the pus gotten from the joint. The joint recovered with only slight deformity.

On February 8th right salpingo-oöphorectomy was performed. A culture from the tube was sterile. She was discharged cured on March 16th.

Fibroids of uterus; carcinomatous degeneration of cervical portion; umbilical hernia; complete hysterectomy; omphalectomy; cure.—Elizabeth B., aged 59, single, was admitted December 30, 1904. Patient had passed the menopause five years before. For one year previous to admission she had been suffering from moderate uterine hemorrhage, and from an abdominal swelling, which had steadily increased in size. No subjective symptoms. There had been increasing anemia, but no loss of flesh or strength.

On January 2, 1905, a complete hysterectomy was performed, and at the same time omphalectomy for a small umbilical hernia. Abdominal wall sutured and skin strapped; drain for pelvic floor left in vagina. The uterus was as large as a football and contained soft fibroids. Tubes and ovaries atrophic. In the cervix was a soft friable tumor, the pathological report of which was adeno-carcinoma (Dr. Mandlebaum).

On February 10th, after an uneventful recovery, the patient was discharged cured.

OPERATIONS ON THE UPPER EXTREMITY. EIGHTY-SIX OPERATIONS; ONE DEATH.

Ununited fracture of olecranon; wiring of fragments; cure.—Solomon P., aged 13 years, admitted February 17, 1906, said that his left arm was broken at birth, and that motion had always been limited. Five months before admission patient injured both elbows. Since then the left suffered several additional injuries, the last one three weeks before he came to the hospital. Except for short periods of inactivity after the injuries, he used the left arm almost as much as the right.

On examination the left shoulder was found flattened, and the acromion prominent. The arm was held with elbow slightly flexed, and the normal carrying angle was reversed. The elbow joint was thickened, and there was a marked posterior prominence of the olecranon. Across the latter a distinct groove could be felt and slight mobility and fine crepitus could be demonstrated. Flexion to 90° and extension to 150° on active motion. Passive flexion to 60°.

At operation, February 21st, the edges of the fragments were freshened and brought together by silver wire cable; skin was closed except for a short Mayo drain, which was removed at the end of a week, and patient was discharged cured on March 3d.

Ununited fracture of surgical neck of humerus and of head of femur; bone suture of humerus; unimproved.—Annie S., aged 55 years, was admitted on November 19, 1904. The patient had fallen from a fire-escape three months before and fractured the right humerus and right hip.

On November 30th bone resection and suture of the humerus was performed. The fracture was cut down upon and part (one inch) of the upper end of the lower fragment was resected in order to obtain a proper approximation. The upper fragment was freshened and the ends brought together and fastened by suturing the periosteum of the two fragments with chromic catgut. The arm was carefully put up in such a manner as to hold the fragments motionless and the arm away from the side. The first dressing was done on December 26th, when primary union of the skin wound was found. Union of the fragments was not complete; there was still some false motion, but limited. On January 9th all dressing was removed and false motion found to be still present. Further operation was advised, but the patient refused and was discharged on January 15th unimproved.

This history is reported simply because it records a failure. Had the patient consented to reoperation the ivory peg method would have been chosen.

OPERATIONS OF THE LOWER EXTREMITIES. ONE HUNDRED AND SEVENTY-FOUR OPERATIONS; NINE DEATHS.

One patient with a diabetic gangrene of the leg died after amputation of the thigh with symptoms of acid intoxication. Another patient died from shock after amputation of the thigh for sarcoma of the femur. Synopses of the other fatal cases follow:

The large number of cases of angeiosclerotic gangrene in this hospital is worthy of note. It is quite probable that the abuse of tobacco in a predisposed individual is a decided contributing cause, the terminal vascular claudication playing an important part. A case of arterio-venous anastomosis of the femoral vessels, by Carel's method has been fully reported in the *Annals of Surgery* for January, 1907. It records a failure and death.

Suppurative phlebitis of saphenous vein; streptococcemia; incision and drainage; death.—Sadie R., aged 50 years, was admitted January 24, 1905. There was a history of snake bite on the left foot six years previously, followed by suppuration. She had had varicose veins of the leg for fifteen years. Three weeks before admission pain, swelling and redness of the whole left leg had set in. Four days

before a large amount of pus was spontaneously discharged, after which the pain diminished in severity.

On admission the general condition was fair. On both legs varicose veins were prominent over the course of the internal saphenous vein. On the left leg the varicose veins showed areas of inflammation. There were four ulcers, in the uppermost of which was a sinus discharging pus.

On January 25th a six-inch incision was made over the varicose veins and much pus evacuated. The wound was packed.

January 30th, an abscess which had developed since the last operation, was opened, about the middle of the left thigh. Again a large amount of pus was discharged. The wound was packed.

The patient began to run a septic temperature. The wounds improved, but the general condition grew worse. A blood culture on February 5th showed streptococci present. Intravenous injections of collargol were tried with no effect. The patient's condition grew gradually worse. Sepsis was marked, delirium set in and death occurred on March 4th. No autopsy.

Osteomyelitis of femur and pelvis; osteotomy and drainage; death.—Hyman S., aged 20 months, was admitted October 10, 1904. Eight days before admission the patient had pain and tenderness in thigh (left), worse at night with fever.

On admission the child looked very ill; the thigh was held flexed and abducted; motion was limited in all directions. Some fulness and tenderness about hip joint and along entire femur. The temperature was 104°, pulse 150.

On October 10th osteotomy of the femur was performed; pus evacuated and the bone cavity drained. The condition of the child grew steadily worse. On October 25th, the hip joint was aspirated and a small amount of bloody fluid was obtained. This proved to be sterile on bacteriological examination. For about a week the general condition seemed to improve, but from November 6th the patient grew gradually worse; the temperature ran a septic course; there was a continual purulent discharge from the wound in the thigh. Sinuses formed on the posterior surface of the thigh, at the bottom of which bare bone—the sacral and iliac regions was to be felt. Symptoms of sepsis continued. Death occurred on November 20th.

Fracture of the neck of the femur; fat embolism (?); death.—C. K., male, aged 52, was admitted to the hospital November 17, 1905, with the history that ten days before he had fallen into a coal hole and had been abed ever since.

On admission, the diagnosis of a non-impacted fracture of the neck of the right femur with displacement upward of the lower fragment

was verified by X-ray examination. A Buck's extension of 13½ pounds was applied. On the fourth day, soon after some mild manipulation of the fragments, the patient suddenly lost consciousness; the entire body became rigid, but there were no twitchings, the pupils dilated, respirations were deep and irregular; the pulse became imperceptible; urine and flatus were passed involuntarily. In spite of very active stimulation the patient died in ten minutes.

Post-mortem. General arteriosclerosis. Cause of death not found. (Dr. Epstein.)

Chronic osteomyelitis of femur; osteotomy; died.—Meyer G., 50 years, was admitted on November 27, 1905. When he was about fifteen years old he was sick in bed for six months with pain in the right shoulder and left hip. A sinus formed at the shoulder which discharged pus and pieces of bone for about fifteen years. A swelling of the hip was incised soon after its appearance and sinuses persisted. Six months before admission there was a cessation of discharge at the hip with increased swelling and pain. Conditions remained stationary until a month before admission, when a fresh sinus appeared lower down the thigh.

On December 5th, osteotomy of the femur and drainage. The entire lower portion of the femur was found much thickened and diseased. There was a large area of necrosis in the internal condyle. The patient reacted well from the operation, but toward evening the pulse became very poor. Stimulation was given frequently, but in spite of this the patient died early the next morning. No autopsy.

Tuberculous osteomyelitis of tibia; osteotomy and iodoform wax filling; tuberculous meningitis; death.—E. S., aged 3 years, admitted February 7th, died June 25, 1906. Osteomyelitis of left femur of fourteen weeks' duration. Discharging sinuses. Osteotomy and wax filling on February 13th. Profuse discharge of pus continued. Curetting of sinuses and of exposed bone. Symptoms of meningitis developed. Tubercle bacilli found in lumbar puncture fluid (Dr. Bernstein). Death. No autopsy.

Septic thrombosis of saphenous vein; excision of portion of internal saphenous vein; death from extension of phlebitis and sepsis.—B. F. was transferred from the medical service with the history that he had some perineal operation at another hospital six weeks before. After the operation patient began to have chills and fever, and pain and swelling of the left thigh. The swelling and pain increased and the patient had almost daily chills and sweats.

When transferred to the surgical service, there was a cellulitis and phlebitis of the left internal saphenous vein. The vein was exposed

in the upper part of its course, was found collapsed and empty, and was ligated. Another incision was made in the lower part of the thigh and the vein found thrombosed. Part of the vein was excised and the wound drained. Irregular chills and rises of temperature persisted; the spleen became enlarged; the patient lost flesh and strength rapidly. The wound in the thigh seemed to be clean and granulating when the patient began to complain of pain in the lower part of the abdomen. His condition then became rapidly worse, and he died on July 29th with symptoms of severe sepsis. No autopsy.

Arteriosclerotic gangrene of foot; end to end arterio-venous anastomosis; death.—This case is reported in detail by Dr. Lilienthal. *Ann. Surg.*, January, 1907.

Periarticular abscess of the hip; incision and drainage; ligation of the external iliac artery for hemorrhage; cure.—Jacob P., aged 9, had typhoid at the age of 7. Four months before admission patient fell on his head, sustaining a severely lacerated scalp wound. He became perfectly well and was so until one month before admission. Then an abscess appeared in the left antecubital fossa, which broke down and discharged for a week. Almost simultaneously abscesses developed on the chest and abdomen. Soon after the child began to limp, and a mass appeared in the right groin. The mass grew larger, and walking became very difficult. For a week before admission the patient had been forced to stay abed on account of fever and pain.

On admission, October 16, 1905, the patient was anemic, poorly nourished. There was a deep-seated abscess in the soft parts of the right thigh, just below Poupart's ligament. The thigh was flexed, abducted and externally rotated; muscle-spasm prevented any motions at the hip.

Operation, October 17, 1905. Pus found deep down in the soft parts. The cavity extended in the form of burrowing sinuses about the neck of the femur. Gauze drains were inserted.

At the first dressing on the fourth day, when the drain was removed, a gush of blood followed from some eroded artery. Packing proved ineffectual, and an extra-peritoneal ligation of the external iliac was done after an attempt to catch the bleeding artery in the pus cavity. Convalescence was uneventful, except for a free discharge of synovial fluid from the wound, due to erosion of the hip-joint, or of a periarticular bursa. This ceased in a week. Discharged November 29, 1905, with excellent motion at the hip-joint and a superficial granulating wound.

Fracture of shaft of femur; silver wire sutures; insertion of internal aluminum splint; cure.—Walter C., aged 7 years, admitted

October 17, 1905, was run over and sustained fracture of shaft of right femur at junction of upper and middle thirds and of right tibia and fibula at their middle with about 2½ inches shortening. The fragments were reduced and the leg immobilized in a plaster cast which was replaced by Buck's extension apparatus after twelve days.

Skiagraphs taken four weeks after the accident showed marked deformity and overriding in the femur. On November 14th an open operation was done and the fragments sutured with silver wire. Immobilization by plaster cast.

X-ray twenty-eight days after operation showed that the silver wire had broken and that the deformity was again present. On December 5th, three weeks after the first operation and seven weeks after the accident, the ends of the bones were again exposed and freed from callus, and an internal aluminum splint inserted into the medullary cavities of both fragments, bringing the fragments in apposition, and holding them with No. 3 chromicized catgut. The leg was immobilized.

The cast was left on for seven weeks, and when removed, the wound was found healed with union of the fragments. Nineteen weeks after the injury the patient was discharged cured, with no shortening, and good apposition as shown by radiograph plates. Functional result excellent.

1. Chronic arthritis (right hip); 2. chronic osteomyelitis of right femur. 1a. Resection of right hip; 2a. Osteotomy; cure.—Alexander Y., aged 18, was admitted August 8, 1904. For three weeks he had had pain in the right hip-joint, with inability to extend thigh, fever at night, chilly sensations and night sweats.

On admission, the entire upper end of the femur was enlarged, tender on pressure and motion; grating in joint and limited movement were found.

On August 17th the femur was opened, and much diseased bone removed. There was some discharge from the wound for several weeks; irregular temperatures persisted, as did tenderness over the right trochanter, above the incision.

On August 31st the head and upper end of the femur were resected, the bone being divided about two inches below the lower border of the trochanter. There was extensive disease of the head of the femur.

On November 1st a large, granulating cavity persisted. It was curetted, swabbed out with formalin (one per cent.) and filled with iodoform paraffine. The wound finally closed, and the patient was discharged on January 23d, cured.

This case is an example of the good results following the treatment of old bone cavities with iodoform wax, according to the method of Mosetig-Moorhof. We have noted equally good results in a number of cases. An old chronic empyema of the thorax, which had with-

stood various thoracoplastic operations and still contained several ounces of pus at the end of a year and a half, was healed in a few weeks, after having filled the cavity with this mixture. The wax was slowly extruded, but the tissues were stimulated and the cure followed.

Ununited fracture of neck of femur; open operation with nailing of fragments; cure.—Harry G., aged 17 years, was admitted January 9, 1905. The patient had been in this hospital for one month in October, 1904, for fracture of the neck of the femur. He was discharged with a hip-splint. As union did not take place, the patient returned for operative interference.

On March 29th he was anesthetized, the joint was exposed and opened from the anterior aspect through Barkin's incision. The head of the bone was found to be separated and yellowish in color, not healthy in appearance. The fracture surfaces were freshened and held in place by a nail passed through a minute incision over the trochanter, on through the neck and into the head of the bone. The extremity was carefully put up in starch and veneering.

The first dressing was not done until May 6th, when the plaster cast which had been applied soon after operation was removed. The nail had been removed about two weeks before. Primary union was evident. Very gentle, passive motion was tried, and the fragments seemed to be well united. The patient was allowed out of bed with a cast on the hip on May 14th, to walk on crutches. All support was removed on May 21st and the patient was discharged cured on May 22d.

The anterior incision severed no muscles, and exposed the head, and especially the neck of the bone very perfectly, so that we were absolutely certain that the nail was in proper position. The result was excellent.

Habitual external dislocation of the patella; Krogius' operation; cure.—Charles M., 14 years of age, admitted June 15th, discharged July 27, 1906. The patient had had since infancy a habitual outward dislocation of the patella, which made him almost a cripple. He came to the hospital for relief. Physical examination showed the following: With the limb in extension, the patella lies mostly over the external condyle of the femur; with the limb flexed to a right angle, the patella lies over the outer surface of the lower end of the femur with its posterior border slightly rotated forwards. With the limb in extension the patella is freely movable; with little force it can be dislocated to the outer side of the femur. When the limb is held tense in extension, the patella moves a little outward as the patient begins to flex his limb, the patella becomes firmly fixed until nearly the right angle is reached, when it suddenly slips on to the outer side

of the femur. If the attempt is made to keep the patella in the position on the anterior surface of the thigh bone, while the leg is forcibly flexed, the patella can not be prevented from becoming dislocated unless flexion is prevented.

On June 20th a flap transplantation was done after the method of Krogius. An incision was made from the middle of the thigh downwards along the outer border of the patella to the tubercle of the tibia. The skin and subcutaneous tissues were dissected back on each side. Two parallel incisions were then made to the inner side of the patella, extending from two inches above its upper border downward to the tuberosity of the tibia. The incisions divided the fascia and muscles to the synovial membrane of the knee-joint. The flap of fascia and muscle was then dissected up from the synovial membrane. The gap left by raising the flap was obliterated by sutures. A four-inch semilunar incision was then made along the outer side of the patella, through the fascia and muscle, down to the synovial membrane, and the fascia muscle flap, previously raised, was brought over the patella, and its edges united to the edges of the incision. The skin was then turned back and the edges of the skin incision united by interrupted sutures with drainage. The patient made an uneventful recovery from the operation. The wound healed by primary union; first motion in the knee-joint was permitted three weeks after operation. When the patient was discharged five weeks after the operation, the knee could be flexed to 110°, and on flexion the patella remained in place on the anterior surface of the condyles of the femur. Six months later flexion of the knee-joint was normal, and the patient could move his knee-joint in all directions without any recurrence of the lateral dislocation of the patella.

This case is one of more than ordinary interest. Before Krogius described his method of operation, surgery had no satisfactory operative method for this affection, although numerous operations had been suggested. By the Krogius operation the relaxed muscles to the inner side of the patella are shortened, the contracted tissues to the outer side of the patella are lengthened, while the fascia muscle flap by its course aids in preventing the outward luxation of the knee-cap. Thus the method satisfies all of the mechanical requirements.

Cavernous angioma of leg; extirpation; cure.—Esther W., aged 10, was admitted January 31, 1905. For three years before she had had pain in the right leg, inconstant and worse at night. For eight months leg had been swollen and complete extension impossible. No fever, no chill.

On admission there was a moderate-sized, tender swelling on upper inner aspect of right leg. The leg was held in slight flexion, but could be voluntarily extended. The hamstring muscles were held

tense. Over the mass was felt a pulsating vessel. The circumference of the right calf was 1½ c. m., greater than the left. The blood count was negative. X-ray showed a dark, mottled shadow in upper third of leg behind tibia and between it and the muscles.

Ten days after admission the patient was anesthetized and a long incision made over the inner part of the gastrocnemius. Here a large plexus of veins was encountered and dissected out up to the popliteal space. The mass evidently went farther up into the thigh, but the dissection was stopped at the knee. A mass about six inches long and three inches wide was removed. It consisted of veins, some thrombosed, others, in which clots had organized, and still others in which calcification had taken place (phlebolith). Wound closed by strapping. The report from the pathological laboratory was cavernous angioma. Convalescence was rapid and uneventful, the patient being discharged well eighteen days after operation.

Arteriosclerotic gangrene of leg; osteoplastic amputation of leg; gangrene of stump; osteoplastic amputation of thigh; cure.—Abraham B., aged 33 years, was admitted March 20, 1906. For eighteen months before admission he had occasional severe neuralgic pains in left leg and foot. Three weeks before admission continuous severe burning and sticking pain set in; ten days before admission foot became swollen, grew dead white in color, then red and purple. A few days later back gangrenous areas appeared on dorsum of foot and tips of toes. Had no thirst or polyuria. Pulse was of increased tension, arteries moderately sclerotic. There was no pulsation in left dorsalis pedis; left foot from ankle down was of a deep purple, cold and livid. Tips of toes were dry, black and gangrenous; there was a large gangrenous area on dorsum of foot.

On March 23d an osteoplastic amputation was performed at middle of leg, with a bone flap to cover raw medullary canal. On March 25th at first dressing, flap looked healthy. Two days later flaps were slightly cyanotic and there was a thick, bloody discharge. On March 31st edges of flaps looked black and dry. Patient now began to have a great deal of pain, was very restless and his temperature was intermittent, rising to 103°. On April 4th a secondary osteoplastic amputation of thigh was performed, osteoplastic flap being made precisely as that described under amputation through tibia. After operation temperature soon became normal, general condition steadily improved and stump healed entirely. Patient was discharged on April 23d, nineteen days after the second operation.

Raynaud's disease; amputation of foot; re-amputation of leg; cure.—Benjamin M., aged 34 years, was admitted October 11, 1904. Had been operated upon two months before admission for Raynaud's disease. Right leg was amputated. About six weeks before admission,

second toe on left foot became blue and very painful. Toe gradually became black, pain increasing. Six days before admission third toe became affected in same way. On admission second toe of left lower extremity was gangrenous (dry) as far as first phalangeal articulation; remainder of toe was of a bluish color. Third toe was gangrenous at the tip. Foot was normal above the metatarso-phalangeal articulation.

On October 17th redness extended up the plantar surface for three fingers; the foot was markedly edematous.

On October 31st the process had extended to the other toes and the patient complained of a great deal of pain.

On November 1st the foot was amputated, subastragaloid, by Chopart method.

November 8th: The process continuing to extend in spite of previous operations, the leg was amputated in its upper third. From this time on the patient made an uninterrupted recovery and was discharged cured on December 4, 1904.

In cases of angiosclerotic disease of the foot, we have found that skin and muscle flaps, united by adhesive plaster instead of suture, give the best results. Sutures, no matter how carefully inserted, tend to cause necrosis by constriction of the already ischemic tissues.

Diabetic gangrene of foot; complication; diabetic coma; amputation of thigh; death.—Johanna E., aged 54, was admitted November 22, 1904. Eight months before had had areas of gangrene on left heel, under left 2d toe, and between 4th and 5th toes. Two and one-half months before had had pain in right second toe; two weeks before toe became gangrenous.

On admission showed signs of furunculosis and eczema. The small toe of right foot was gangrenous; gangrene extended a short distance on dorsum of foot where there was a line of demarcation.

On November 27th the toe was amputated without anesthesia. On December 4th the patient suffered severe pain and the gangrenous area kept growing larger. Urine contained three per cent. sugar. The urine has from admission contained diacetic acid and acetone. Patient gradually losing.

December 21st: Thigh amputated.

After operation condition steadily became worse; patient went into a semi-stuporous condition; urine contained diacetic acid and acetone, albumen and many casts. The patient could be roused only with difficulty, and died on December 25th.

Arteriosclerotic gangrene of leg; mesenteric thrombosis; amputation of thigh; died.—Harris M., aged 45 years, was admitted on December 12, 1905. For several years he was in the habit of drinking

a great deal of water. He did not lose weight, although his appetite was poor. During this period he passed large quantities of urine. His present illness began suddenly with severe lancinating pains in the left leg, which lasted about three hours and then slowly subsided. Since the onset of the trouble patient has been unable to walk, and at the time of admission could not move leg at all. Sensation was lost from the knee down, and the leg appeared swollen and purple. The temperature on admission was 98.6°, pulse, 76, and respirations, 24. Examination exhibited marked tenderness along the course of the femoral vessels.

On December 13th the thigh was amputated under chloroform and ether. Patient reacted well from the operation, but that same night he became restless and delirious. On December 20th, the respirations became labored and rapid. The abdomen was markedly distended. He complained of great pain in the epigastrium. When the dressing was removed from the leg the flap was found to be entirely gangrenous and had a very foul odor. The patient became more restless and noisy and the pain in the epigastrium increased. On the following day he suddenly lost consciousness, and in a few moments died.

SOME NOTES ON THE SURGERY OF THE HEAD AND NECK, BASED ON THE EXPERIENCES OF THE STAFF OF THE SECOND SURGICAL SERVICE FROM DECEMBER, 1904, TO DECEMBER, 1906; WITH HISTORIES OF SOME CASES OF INTEREST, AND OF ALL FATAL CASES.

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POSTURE IN OPERATIONS ON THE HEAD AND NECK.

In the various operative procedures for affections of the head and neck, a correct posture of the part to be operated upon is of no little importance. Especial attention has been paid to this subject during the last decade, and the value of a correct posture has been frequently emphasized. The opening of a deep-seated abscess in the neck, the removal of diseased glands, the extirpation of a goitre may be and often is rendered very much easier when the correct position of the part to be operated upon is maintained. The various postures used by us may be thus defined:

(1) *For operations upon the cranium and brain.*—The body of the patient should be horizontal, the shoulders not raised, the head should be raised by pillows so as to make at least an angle of 30° with the horizontal. For operations in the frontal region, the head should rest on the occiput; for operations on the right or left side—the temporo-parietal region—the head should be turned on the left or right side; for operations in the occipital or suboccipital regions, the patient's body should either rest on the abdomen with the face pointing downwards and projecting beyond the end of the table, or the body should be on its back and the head very much raised, so that the occipital region is well exposed. Occasionally in operations in the one or other suboccipital region, it is of advantage to have the patient lie on his side, and the face turned almost toward the table.

There is a great advantage, in operations on the brain, in having the head raised—the hemorrhage both from the scalp and from the bone is much less. We have more than once seen persistent oozing from the scalp cease at once when the patient's head was raised a little higher.

(2) *The correct position of the patient in operations upon the submaxillary regions and the neck.*—The patient should be on the back with one or more pillows under the shoulders, so that the head rests against the table. It is not advisable, as one sees done very often, to have not only the shoulders, but also the head somewhat raised. The face should be turned to the one or the other side as required. The posture above described makes tense the anatomical landmarks of the neck, which are the sites for the usual incisions for operations upon the larynx and trachea, the thyroid gland, the great vessels of the neck, etc.

(3) *Roser's position* for operations in the oral cavity, such as extirpation of the tongue, staphylorrhaphy and uranoplasty, bronchoscopy, esophagoscopy, etc.

THE SPREAD OF INFECTION AND EDEMA IN THE SOFT TISSUES OF THE HEAD AND NECK FROM THE PRIMARY FOCUS.

In general, the following are the directions taken by a spreading infection:

The scalp; frontal region.—Slightly backwards over the scalp, but mainly forwards and downwards over the eyebrows, causing edema of the lids and closing of the eyes. Edema of the face below the eyes is rare.

Parieto-temporal region.—Backwards and forwards over the scalp, but more forwards on account of looseness of pericranial attachment. Edema of lids is not frequent, but there may be a decided puffiness of one or the other side of the face.

Occipital region.—Upwards over the scalp and towards the mastoid regions; practically never downwards over the neck.

Supra-orbital region and orbit.—Over frontal region but little or not at all over face.

Malar and superior maxillary.—Upwards toward eyes, causing edema of lids but never spreading downwards to neck, unless very advanced.

Nasal.—To orbital, frontal and malar regions; seldom downwards over face.

Upper and lower lip.—Edema of face and lids seldom spreads downwards to neck.

Submaxillary.—Slight edema of face; swelling of neck; edema frequently spreads under chin to other side.

Neck, anterior to the sterno-mastoid muscles.—The tendency is forwards and across the median line, rather than backwards; upwards to the submaxillary region rather than downwards. Even in very severe infections, the lower part of the neck was little or not at all affected.

Behind the sterno-mastoid muscle.—Affections are very apt to remain well localized.

The importance of a knowledge of the direction in which an infection in the regions mentioned is apt to spread lies in the fact that incision should always be directed so as to drain and prevent spreading of the infection to the areas above mentioned; drainage should be established in the part of the wound nearest to these areas. By a careful adherence to the principles thus laid down, secondary incisions have become less frequent.

THE VALUE, FOR DIAGNOSTIC PURPOSES, OF PERCUSSION OF THE SKULL IN SUSPECTED FRACTURE OF THE VERTEX.

During the past two years there were admitted to the Second Surgical Service six patients with fracture of the skull, in four of whom operative interference was required. One patient with a fracture in the right parietal region recovered without operation; another, with a fracture of the base, died a few hours after admission. Of the four cases in which interference was necessary, one—a patient with a compound fracture—died; the others recovered. We have found the percussion of the skull a very valuable diagnostic agent, and we believe that its value has not received sufficient recognition. In a suspected fracture of the vertex of the skull, if percussion is made over the frontal region of the affected side, and one listens with the stethoscope over the skull, passing from before backwards, the changes in the percussion sound are very characteristic as the site of the fracture is approached. On the normal side, the sound remains of a high pitch and gradually decreases in intensity as the

stethoscope approaches the occipital region. On the affected side, the sound becomes suddenly much decreased in intensity as the site of the fracture is reached, and at the same time its quality is different; the pitch is lower and more coarse, and the sound often has a more or less cracked pot character. As soon as the stethoscope, in its backward path, passes beyond the fracture, the sound, although of low intensity as compared with the normal side, becomes again of much higher pitch. This sudden rise in pitch is due to the sound waves, which are carried *around* the fracture from the normal side, and therefore, has the percussion sound, a pitch similar to, but of less intensity than that of the normal side.

The presence of a fracture of the skull is not of itself an indication for operative interference, and we have seen many patients, especially children, recover without operation. The presence and the persistence of brain symptoms, even if very slight, is an indication that an exploratory operation should be done. A simple incision of the scalp will never do any harm. With the exception of one case, whose history is given below, all of the patients we have operated upon made an excellent recovery. The history of the patient who died follows:

J. L., 50 years, admitted Aug. 6th, died Aug. 8th, 1906. The patient was admitted in coma, after a fall, with several large wounds in the left fronto-parietal region, a depressed fracture of the temporal bone, and fracture of the nose. He was in very poor condition, pulse 40, divergent strabismus, pupils equal. He was at once operated upon, the depressed fracture raised, and some loose pieces of bone removed. No improvement followed, and death occurred 36 hours later. The post-mortem examination showed that in addition to the depressed fracture, which had been operated upon, there was a fracture of the base involving the middle fossa; laceration of the occipital lobes of the brain; beginning meningitis.

The above case was, from the nature of the injuries, a hopeless one, and death was not due to the operative interference.

AN UNUSUAL RESULT OF AN INFECTED WOUND OF THE SCALP.

Besides the operations for fracture of the skull above mentioned, the skull has been opened three times by us for extradural opera-

tions. In two patients intracranial neurectomy—the Gasserian ganglion operation of Hartley-Krause—was done; and once an extradural abscess was drained. The first two patients recovered, and were relieved of their symptoms; the last patient died. The case is of interest because the patient succumbed to a streptococcus infection of the meninges, due to an infected scalp wound:

Ida K., 2½ years of age, was admitted on September 23d, 1906, with the history that 10 days before she had fallen on the street and had been brought home with a bleeding scalp wound. This was sutured by a physician. Two days before admission she had a chill with fever. She was brought to the hospital with a suppurating wound in the left frontal region in the bottom of which bone was exposed. The child looked very ill, but had no brain symptoms. The wound was exposed, and as the bone seemed to be diseased, a small part of it was removed; pus was seen escaping from under the bone, and about one inch of the bone was removed and a small quantity of pus evacuated from under it. Drainage. As high fever persisted, and there was a continued discharge of pus from the wound, the dura was again exposed, a small incision made into it, and a small quantity of pus evacuated from under the dura; drainage. The symptoms of sepsis continued; meningeal symptoms appeared and death occurred on October 1st. No post-mortem examination was permitted, but cultures from the pus at the operations gave a pure culture of the streptococcus pyogenes.

In both of the patients in whom intracranial neurectomy was done, the operation was performed in two stages. In both cases it was found, after the osteoplastic flap had been turned down, that the patient's condition was not good, and further interference was deferred for about one week. In one of the patients there was severe bleeding from the middle meningeal artery, when the ganglion was exposed, so that the final operation on the nerves had to be deferred to a third sitting. The history of this case follows:

Trifacial neuralgia; intracranial neurectomy; cure.—A. J., tailor, aged 32, was admitted to the hospital September 23d, 1905, with a typical history of severe trifacial neuralgia, lasting one and one-half years. A year before admission an infraorbital neurectomy had been performed with some temporary relief. On admission, September 23d, 1905, no external cause for the symptoms could be found.

Operation, September 29th, 1905. A curved hemostatic scalp suture from the right external angular process of the orbit to the root of

the zygoma was passed. The tissues were cut through within the arched suture. The bone was penetrated at intervals by the burr. The openings were joined by cutting through with the De Vilbis forceps, and the flap was turned down. The temporo-sphenoidal lobe was raised, but the bleeding was too free to see the ganglion or expose it. A packing over a rubber dam was inserted.

Second operation, Oct. 2d. The packings were removed. The temporo-sphenoidal lobe was gently elevated, and the ganglion was located with blunt hooks, but the bleeding again became very profuse and could not be stopped. A Mickulicz tampon was inserted.

Third operation, October 6th. Bleeding was again very profuse, and attempts to grasp the ganglion failed. The second and third branches were grasped, resected and removed. A Mickulicz tampon was firmly inserted.

After the third operation, up to the time of discharge (November 5th), there was no recurrence of the pain. The flap healed well. The area of anesthesia of the face corresponded to the distribution of the nerves cut.

THE PREVENTION OF HEMORRHAGE IN CRANIAL OPERATIONS, AND THE VALUE OF OBSERVATIONS OF CHANGES IN THE BLOOD PRESSURE.

Surgery has been able to show much better operative results, poor as they yet are, since we have used the osteoplastic flap method, first recommended by Wagner, and have learned to prevent bleeding from the scalp. Whenever possible, we make the incision in the scalp after an elastic tourniquet has been applied around the head, just above the ears. If the incision in the scalp has to be made so low that the rubber tube cannot be applied, one should make use of the double row of "round and round" sutures between which the incision is then made. When one of these two procedures is made use of, the bleeding from the scalp should be practically nil, and one great cause of shock be avoided. One disadvantage, and the only one, of the "round and round" continuous sutures is that the tissues may be cut through by the sutures in a few days with slight sloughing. If, after the scalp has again been turned back and sewn into place, the sutures be cut in a few places, this cutting through of the sutures will be prevented. No secondary bleeding will occur if the sewing into place of the flap has been correctly done.

By means of the osteoplastic flap method, a very free exposure

can be obtained; the time consumed from the making of the incision in the scalp, to the turning back of the bone flap should seldom be more than ten to fifteen minutes. This presupposes, of course, that the operator makes use of a good motor drill, of which there are a number of reliable ones on the market. Recently, Hartley has recommended a drill by means of which the bone can be sawed through obliquely, so that the bone flap, when it is turned back into place, will rest upon the adjoining bone and not upon the dura. We consider the idea not only new, but of importance, and shall in the future try the instruments recommended by Hartley and Kenyon.

With reference to the two cases of intracranial neurectomy above mentioned, and to a case of abscess of the brain and two of tumor later to be reported, it would be in place to state the position taken by us in reference to the two-stage operations as recommended by Horsley and others. There is no doubt that the operative mortality has been much reduced by doing operations on the brain in two stages. At the first sitting, the osteoplastic flap is made, and a few days, or a week later, the brain operation proper. Since we have learned to prevent hemorrhage from the scalp, to do the bone cutting rapidly, and above all, since we now have a method of judging of the manner in which the patient stands the opening of the skull, it is not necessary to do every operation in two stages. Whenever the opening of the skull has taken much time, as may be the case in operations in the occipital region, or where, for any reason, the patient's condition is not good, the operations should be divided into two stages. But we do not believe that this should be done in every case. The condition of the patient's blood pressure is a very reliable index of the patient's condition. When normal or approximately normal blood pressure is sustained throughout the operation, we are assured that the operative procedures have not been of sufficient gravity to induce shock. There is never any cause for alarm until the blood pressure begins to fall. This fall of blood pressure will usually occur before the pulse shows signs of weakening. In operations on the brain or its membranes, the blood pressure should be taken every few minutes, and we are accustomed to have one of the assistants, experienced in this line of work, make the observations for us. There is seldom a fall in pressure, or only

a slight irregularity, if the dura be unopened, when the manipulations have been rapidly done; but a fall of blood pressure occurs after irritation of the dura mater and especially of the brain tissue, and is proportionate to the pressure exerted upon the brain, the hemorrhage, and the duration of the manipulations. A continued and gradual fall in pressure calls for rapid conclusion of the operation; a sudden and marked fall is an indication that the manipulations must be stopped until the pressure has risen somewhat. If the large and sudden fall persists, the operation must be brought to an immediate conclusion. In one patient recently operated upon for a sarcoma in the Rolandic area, there was a sudden drop of blood pressure just after the neoplasm had been excised; as quickly as possible, the flap was turned back into place and sutured. That this was the correct procedure was shown by the fact that, although the pulse was of good quality when the fall of pressure occurred, it became extremely weak and thready within a few minutes after the operation was concluded.

PALLIATIVE OPERATIONS FOR TUMORS OF THE BRAIN.

There are a large number of tumors of the brain which cannot be localized; there are as many that can be localized, but cannot be removed, either because they are in an inaccessible region, or because of their size, connections or nature (infiltrating). In these patients, the headache may be relieved, the blindness and other symptoms be prevented, perhaps for years, by a decompressive operation. Inasmuch, as the general symptoms of brain tumors are due to the increase of intracranial pressure, it is rational to do an operation by which an outlet is given to this pressure. This is accomplished by making a large opening in the skull and, usually, opening the dura, thus allowing the brain to bulge under the soft parts of the skull and a hernia to occur. The operation may either be done in the region in which the tumor is suspected or located, or better in one of the silent areas of the brain. The operation is best done over the right temporal lobe, as a hernia in this region will give few or no symptoms. We consider the intermuscular method of Cushing the best for this purpose. Unfortunately, however, many of the patients come to the surgeon when more or less

loss of vision has occurred, but even in these patients a decompressive operation may relieve the nausea, vomiting, headache, and may stop the convulsions. In the following case, a decompressive operation was done, and the patient relieved of her headache.

Gussie F., 14 years of age, admitted October 21st, 1905. For seven months the patient has had symptoms of tumor of the brain. On admission there was headache and pain in neck, almost complete blindness, advanced neuro-retinitis. An osteoplastic craniotomy was done over both occipital regions, but the dura was not incised, as no tumor could be felt on palpation. After the operation, from which the child recovered uninterruptedly, the headache was relieved and the child was brighter. There was much bulging of the flap. The child was discharged after several months in good general condition, free from headache, but totally blind. The later history is unknown.

We have operated upon several patients before blindness had occurred, and have observed them for years free from those symptoms which make the condition of a patient with an inoperable tumor of the brain especially pitiable—headache, nausea and vomiting, blindness.

Traumatic subcranial hemorrhage: premature ossification of the cranial bones: craniotomy: improved (?).—The child, L. D., was admitted to the hospital when nine days old, May 30th, 1905, with the history of a difficult instrumental labor. It was apparently well, until three days after birth, when convulsions set in, mainly in the arms. They recurred about every fifteen minutes. On the fifth day a ptosis of the left eye was noticed. The convulsions became less frequent, but the child lapsed into a stuporous state.

On admission the child was semicomatose. There was a left ptosis with a dilated immobile pupil and absence of all ocular movements. The right eye was normal. The anterior fontanelle was tense and bulging. There was a discoloration over the left frontal region. No paralysis of the extremities. The patient remained in the hospital until June 10th, in a stuporous state most of the time. At discharge there was some general improvement.

The patient returned to the hospital October 14th. Apparently he could not see or hear. The left eye was in the same condition as before. The parietal bone overlapped the frontal bones and the sutures were ossified; the fontanelles were obliterated. The legs were spastic with increased reflexes.

A large button of bone was removed from the fronto-parietal re-

gion on November 3d. The child remained in the hospital for several weeks, but improvement was doubtful.

Tubercular meningitis; no operation; death.—David P., 10 years old, was first admitted to the hospital on Nov. 27th, 1903, with a diagnosis of chronic osteomyelitis of the femur. Six months previous to this he had been operated on at the Ruptured and Crippled Hospital and was discharged with a sinus, which had not yet healed. On the day of admission, he had a sequestrotomy and osteotomy performed. On June 26th of the same year, he returned to the hospital with the same trouble. Another osteotomy was done, with a filling in of the cavity with bone wax. He was apparently well until July 25th, 1905, when he again returned, having noticed a swelling at the upper part of the scar, nine days before, which became larger and more tender. After admission the swelling became larger and more superficial. Incision and drainage was done on July 26th, under eucaine. Some whitish pus escaped, with a small amount of blood. The following day both hands were covered with a diffuse herpetic eruption, which was diagnosed dysidrosis. On July 31st, the wound was found to be filled with sloughs, and bare bone could be felt at the bottom of the sinus. The sinus was curetted. On Aug. 16th the patient was discharged. During his stay in the hospital, he ran no temperature. On Nov. 3d, the patient again came to the hospital with a discharging sinus at the bottom of which bare bone could be felt. On Nov. 7th, a sequestrotomy for necrosis of the femur was done under local anesthesia. On Nov. 20th, on account of diphtheria being discovered in the patient in the adjoining bed, 500 units of antitoxin were given to the patient, and he was transferred to the Isolation House, where he received 2,400 units more. The throat was found to be slightly reddened, but there was no exudate. He was discharged on Nov. 25th, but returned on Nov. 30th. The boy had complained of slight headache, was irritable and unwilling to play. He vomited a few times, became irrational and failed to recognize those around him. The wound in the thigh continued to discharge. It was cleaned out and strapped. On Dec. 2d, twitchings of the left side of the face developed, and also rigidity of the left leg. There was also slight rigidity of the neck. The following day Kernig's sign was noted. A lumbar puncture was performed, the report on which was tubercle bacilli. On Dec. 4th, the patient showed signs of improvement (after lumbar puncture), but that evening twitchings of the facial muscles, irritability and rigidity of the neck appeared. Two days later, the child became stuporous, ptosis of the left eyelid and marked strabismus developed. The temperature during this period was very irregular, but not high, the pulse and the respirations were normal. The leucocyte count was low (9,600).

On Dec. 8th, the right side of the face became paralyzed with strabismus of the right eye. There was Cheyne-Stokes respiration. From that time on the child went from bad to worse, until its death on Dec. 12th. No autopsy.

Cerebral abscess; craniotomy and drainage; death.—S. B., aged 34, admitted Sept. 24th, died Oct. 22d, 1906. Eleven days history of pulmonary symptoms, diarrhea, headache, nausea and vomiting. While under observation on the medical service, patient had a generalized convulsion on September 30th, followed by unconsciousness. Thereafter, he had a slight attack every few days. On October 9th, there was noted weakness of the right side of the body and face. On October 14th, he became drowsy; by the 19th he was in stupor, with beginning optic neuritis. As the weakness of the right side had increased, an exploratory operation was done on the left side, an abscess in the left Rolandic area found, and about one ounce of pus evacuated with drainage. The patient died in coma about 30 hours after the operation. No autopsy.

Suspected brain cyst; exploratory craniotomy; death.—Harry L., aged 41 years, admitted March 21st, 1906, transferred from medical side with following history:

About one year ago patient fell, striking left side of head. Lost consciousness for a few minutes, after which he could not speak. Recovered completely after six days. Four months before admission suddenly lost consciousness. At that time there was twitching of facial muscles; attack lasted about ten minutes. Three similar attacks followed at intervals of about a month. Four days before admission suddenly lost power of speech, became stuporous and had irregular twitchings of right upper and lower extremities. Physical examination negative.

Diagnosis of brain cyst was made and, although patient's condition improved, operation was advised. An elliptical osteoplastic flap about two inches across was made in left parietal region at junction of frontal and parietal lobes. Dura appeared fairly normal. On opening, there was noted thickening of pia, with some adherence of pia to brain substance, localized lepto-meningitis. Brain substance aspirated several times without result. Dura sutured, flap turned back and sutured, small drain in lower angle.

After operation, temperature rose and patient had convulsions of right side of face and right extremities with deviation of head and eyes to right. Nothing was found in wound to account for this condition. Blood count showed a leucocytosis of 24,000 with 84 per cent. polymorphonuclear neutrophiles.

General condition became worse, convulsions increasing in fre-

quency; temperature rose to 107° and patient died March 26th. No autopsy.

Sixty-two operations were done on the face and mouth, with six deaths. The histories of the fatal cases are appended. Two patients died after radical operations for carcinoma of the inferior maxilla. In one case death was due to shock; in the other, death was sudden, probably from cerebral embolism, two days after operation.

Bilated anchylosis of the jaw; resection of the condyloid processes; cured.—Fanny M., 18 years, was admitted to the hospital Dec. 17th, 1905. Eight years before, the patient had fallen downstairs, and struck her chin, driving the lower jaw backwards. Immediately after the accident, she was unable to open her mouth as widely as before. Limitation of motion became more pronounced. At the time of admission there was absolute locking of the jaws, with evident bony anchylosis, and this condition had existed for a number of years. Food was taken in liquid form through an opening made by the extraction of the two upper and two lower incisors.

On examination, a marked recession of the chin was seen. The tip of the inferior maxilla was displaced downwards, backwards and slightly to the left. A resection of the left condyloid process of the superior maxilla was done on Dec. 20th. This was done by fracturing the zygomatic process, and turning the osseo-cutaneous flap downwards. On Dec. 29th, the condyloid process of the right side was treated the same way. The patient began to run slight temperatures after the operation. Pus was found to be discharging from both wounds. Drainage tubes were inserted. After this, the discharge subsided and the patient made a rapid recovery. She was able to open her mouth widely, and the functional result was perfect. She was discharged cured on Jan. 27th, 1906.

Carcinoma of inferior maxilla; resection of inferior maxilla with disarticulation at temporo-maxillary joint; death.—Herman F., foreman, aged 37, was admitted to the medical service June 26th, 1905. The patient had been always well except for an attack of facial erysipelas thirteen years before. No evidence of syphilis. His present illness began three months before admission, when a swelling in the left side of the neck and gums was noted, with increasing inability to open the mouth. A dentist used local applications without avail. About May 10th, the patient went to a doctor, who gave him three gluteal hypodermic injections and an inunction. The breath had been foul since the onset; had been salivated for the last few weeks; no pain in mouth. Three weeks before admission there were malaise, jaundice, bloody stools and urine for a few days. Bowels were

irregular and appetite poor. There was weakness and a loss of 12 pounds since the onset. No cutaneous eruptions.

The physical examination was negative, excepting for the local condition in the mouth, which was as follows: Teeth and gums in poor condition; there was pyorrhea alveolaris. On the left side there was a large ulceration, involving the cheek and gums. The tongue was moist and coated; the breath fetid; throat congested; left cheek swollen. The patient could not open the mouth widely. The submaxillary and cervical glands are involved on both sides; numerous lymphatic enlargements on the left side. Small glands in axilla and groins. The ulceration mentioned above involves tonsil and palate.

Treatment.—Sodium iodide 10 grains three times a day. Potassium chlorate mouth wash.

June 29th.—Marked improvement in appearance of ulcer.

July 15th.—A piece of the ulcer was excised. Pathological report; epithelial carcinoma (Dr. Mandlebaum). Patient was transferred to surgical division.

On July 21st, 1905, under chloroform anesthesia, a curved incision through the soft tissues of the left cheek into the mouth was made, from the oral angle to the malar bone, parallel with the mandible, thus exposing a mass involving the jaw. The periosteum of the jaw was reflected; two bicuspid teeth removed; the lower jaw was then sawed through at a point about one inch anterior to the angle, disarticulated on the left side and removed at the mandibular joint. The surrounding areas of carcinomatous infiltration were thoroughly excised, including some portions over the superior maxillary. Packings placed at these upper and lower areas. The mucous membrane was sutured throughout with catgut. Fine silk interrupted for the skin; dry dressing.

The specimen showed carcinomatous infiltration of soft tissues of cheek and of inferior maxilla for an area about two inches from body back of ramus.

July 21st.—Patient reacted well; some slight vomiting on the table; no post-operative shock.

On the afternoon of July 23d, after swallowing some water, the patient had a slight convulsion (nurse's statement). When seen, respiration was feeble and gasping; pulse completely obliterated. Artificial respiration was resorted to without result. Death occurred within a few minutes. No autopsy.

Carcinoma of inferior maxilla; resection; death.—I. S., 60 years old, admitted May 10th, died May 26th, 1906. Two months history of swelling over left side of lower jaw. On admission there was a

tumor springing from the inner surface of the inferior maxilla on the left side, of the size of a lemon, its surface ulcerated, with several enlarged submaxillary glands. A section of the growth was removed and sent to the pathologist, who reported it as carcinoma. On May 24th, under chloroform anesthesia the left common carotid and the right external carotid arteries were ligated, the enlarged glands removed from the submaxillary region, and the greater part of the left ramus removed. The cavity left was packed with gauze. The patient stood the operation well and did fairly well for two days. Signs of pulmonary affection then appeared, followed by death on the third day after the operation. No autopsy.

Acute lymphatic leukemia, gangrenous gingivitis, phlegmon of jaw; osteotomy and drainage; death.—Benjamin L., aged 15 years, was admitted March 12th, 1905, with a history of increasing pain and swelling over right inferior maxilla.

On admission the temperature was 104°. The right side of the lower jaw was enlarged and tender. There was an ulcer on the buccal mucous membrane and gangrenous patches along the gum over the swelling. Submaxillary and cervical glands enlarged.

The gangrenous areas were curetted on March 13th, and a small cavity behind the first molar on the right upper maxilla was curetted and packed with iodiform gauze.

A differential blood count on March 15th showed:

Total white count	130,000
Differential polynuclears	2.0%
Large mononuclears and transitional	78.7%
Small mononuclears	19.0%
Eosinophiles	0.3%

On March 15th the inferior maxilla was opened; the bone was found necrotic.

The patient's condition grew rapidly worse. He was delirious; the temperature remained high until death (106° to 107.2°).

Death occurred on March 20th. No autopsy.

Hare lip, cleft palate; plastic operation; death.—Harry Z., aged seven months, was admitted May 3d, 1905, with cleft palate (complete) and double hare lip. The general condition was good and the child well nourished.

A plastic operation was done on May 5th. The os incisivum was fractured at its base, pressed down into place and held by silkworm gut sutures. The hare lip was treated in the usual manner by freshening the edges without sacrifice of tissue and then suturing. After operation the stomach was washed out and a small amount of blood obtained.

The child was profoundly shocked, did not react, and in spite of active stimulation, died on May 6th.

No autopsy.

Sublingual abscess; aspiration; death.—Sophie S., aged 32 years, was admitted January 16th, 1905. The patient had had carious teeth on the lower left side for some time. About ten days before admission, swallowing became difficult and a swelling was noted on the left side just beneath the jaw bone. Speech soon became painful, and the swallowing of solids impossible. No chills, fever or vomiting.

On admission there was a swelling extending down the middle of the neck from the inferior maxilla to within 1½ inches of the sternum and laterally to a line dropped from the angle of the jaw. It was firm and almost immovable. Because of slight enbarrassment of respiration immediate operation was decided upon.

Under general anesthesia, an aspirating needle was inserted into the tumor and a small amount of pus obtained. The patient suddenly became very cyanotic, and in spite of every effort, including tracheotomy with inflation of the lungs and artificial respiration, ceased to breath and died upon the table. No autopsy.

The patient refused absolutely to permit any operation unless general anesthesia was employed. Its dangers were fully explained and local anesthesia urged. It is a question whether, under these circumstances—by no means unique—it would not have been better to refuse to operate upon the patient.

Bone cyst of inferior maxilla; excision of portion of wall; improved.— Harry N., 20 years, was admitted on Jan. 9th, 1906. About eight months before, patient noticed a hard nodule on the left side of the inferior maxilla, which gradually increased in size. There was no interference with function. Physical examination showed a mass, about the size of a goose egg, springing from the middle of the outer surface of the horizontal portion of the inferior maxilla. It was intimately connected with the bone, smooth and intensely hard, except in two small areas at its most prominent portion within the mouth, and here it was yielding and elastic and gave the sensation of a thin shell. Resection of part of the wall of the tumor was performed on Jan. 17th. The operation was done through the mouth. The entire cavity was curetted. Pathological report was cyst with papillary hypertrophy (Dr. Mandlebaum). An X-ray showed a large area of rarefaction. The cavity was packed. The patient's general condition improved, and he was discharged on Jan. 30th, cured, although a cavity of considerable size remained.

Nerve anastomosis for facial palsy; improvement.—Bertha G., aged 17, was admitted August 7th, 1906, with the history that seven years before she had been operated upon for mastoid disease, since

which time she had a complete paralysis of the facial nerve on the left side. Examination showed that all the muscles of the left side of the face reacted to the faradic current, although their contractile power was diminished. On August 10th, under chloroform anesthesia, the spinal accessory nerve was exposed through a vertical incision behind the sterno-mastoid muscle and the facial nerve exposed by an incision through the parotid gland behind the angle of the lower jaw. The spinal accessory was split with a fine Graefe knife, and part of it turned upwards and united to a part of the facial nerve, which had been similarly split off, by fine silk sutures. The nerves were accurately approximated without tension. The skin was closed without drainage. The wound healed by primary union. After the operation, the patient had complete control of the left arm, although she declared that the entire extremity felt weak. She was discharged 11 days after the operation, and was instructed to use an electric battery at home. Two months later she presented herself for control. No improvement was to be noted. After six months, there was slight power in the lower branches of the facial nerve. The patient declared that the muscles contracted better when she used the electric battery. She was able to draw the angle of the mouth a little outward and upward. The patient then left town, and since then it has been impossible to obtain any information concerning her condition.

Seven operations were done on the pharynx, larynx and trachea, with one death, that of a child who died from pneumonia several days after the opening of a retropharyngeal abscess. The histories of a case of laryngectomy for carcinoma, of removal of a primary tumor of the trachea, and of three cases of lower bronchoscopy with removal of a foreign body from the bronchus follow:

*Carcinoma of larynx. 1. Preliminary tracheotomy; 2. total laryngectomy; 3. secondary suture of laryngectomy wound; cure.***—Joseph, aged 57 years, admitted November 16th, 1905. Had been hoarse for a year before admission. About a week before entering hospital voice became husky and patient experienced pain on swallowing. Some loss of weight and strength. There was considerable enlargement of lymph nodes in anterior and posterior cervical chains and in submental and maxillary regions. A large mass occupied right side of larynx, pushing chink between vocal cords to the left, infiltrating right cord, but not involving epiglottis. Lungs showed signs at right apex. No tubercle bacilli were ever found in sputum.

* At present writing, about two years after the operation, there is an inoperable lymph node recurrence in the right side of the neck. Patient's general condition excellent.

Preliminary tracheotomy was done on November 24th; and total laryngectomy on December 6th. The upper end of the trachea was fastened into the lower part of the wound. The esophagus was accidentally injured and the opening was at once closed with silk sutures. The patient stood the operation very well. On the fourth day, the esophageal suture line broke down and left an opening through which food passed, necessitating the use of a stomach tube when the patient was fed.

On January 5th the edges of the esophageal fistula were freshened and united by suture. There was no union and on February 2d the operation was repeated. When the patient was fed a pad was placed over the wound to control leakage. Ten days after the second operation patient was able to feed himself, and to take fluids without leakage. He gained considerable in flesh and strength and was discharged cured on February 14th. When the patient was seen, about six months later, he was able to speak in a whisper, by swallowing air and then expelling it through the mouth. The articulation was excellent.

Primary fibroma of the trachea; tracheotomy and extirpation; cure; secondary granulation tumor obstructing trachea; tracheotomy and removal; cure.—Frances P., 10 years of age, admitted March 22d, 1906. Three months before, the child began to have difficulty in breathing; she began to cough and to be hoarse. These symptoms gradually increased up to her admission to the hospital. Laryngological examination showed a globular tumor below the vocal cords, of a dark red color, attached to the posterior wall of the trachea by a broad base, and reducing the lumen of the trachea by more than one-half. May 3d: Operation—chloroform; before the operation everything was gotten in readiness so that immediate tracheotomy could be done if there were signs of asphyxia when the patient was under the anesthesia. This precaution was found to have been a wise one, for as soon as the child was deeply under the anesthetic, breathing became obstructed, and the child became deeply cyanotic, so that a rapid tracheotomy below the thyroid had to be done. The tumor was found to spring from the third, fourth and fifth cartilages by a broad base. As it was very soft and friable, it was removed with scissors and forceps, and its base cauterized with the actual cautery. The wound in the trachea was partly closed and a tracheotomy canula inserted. Convalescence was rapid and uneventful. The wound was healed on June 19th; there was no difficulty in breathing; the voice was normal; laryngoscopical examination was negative. The tumor proved to have been a fibroma (Dr. Mandlebaum).

About two months later, the child returned to the hospital on

account of the recurrence of difficulty in breathing and hoarseness. Examination showed that there was a small growth partly obstructing the trachea, which sprang from its right side at the level of the previous tumor. The old tracheotomy scar was incised, the trachea re-opened and the tissue, which proved to be granulation tissue removed. Three weeks later, the patient was discharged cured, and she has remained well since that time.

The Danger of Sudden Asphyxia in Operations on the Larynx and Trachea.

When operations are to be performed for tumors of the larynx or trachea, or for tumors which compress the trachea, the danger of sudden asphyxia should always be kept in mind. As soon as the patient is deeply under the effect of the anesthetic, a relaxation of the parts occurs, and a tumor which caused only partial obstruction before, may cause total obstruction of the air passages with resulting asphyxia. This is more apt to occur in tracheal than in laryngeal obstruction, although we have seen it in an operation for a small papillomatous tumor of the larnyx. The danger is greatest in operations for goitres of large size which have compressed the trachea and perhaps softened it, and in tumors of the trachea obstructing its lumen. The asphyxia comes on very suddenly; and, if the operator is not prepared, death may occur before tracheotomy can be performed. In cases of this kind, therefore, the operator should be ready to operate before the anesthesia is begun. The case above recorded shows the value of such precautionary methods. Everything was ready and the operator and assistants ready to proceed before the anesthesia was begun. The child suddenly became deeply cyanosed, and had not the trachea been opened quickly, death would have probably ensued. Although there was no delay before the tracheotomy was done, the child was almost black before it could breathe through the opening in the windpipe.

Bronchoscopy for the Removal of Foreign Bodies from the Bronchi.

It is only a few years since Killian first described the bronchoscope, but already it has been of value in a large number of cases. For the successful use of the instrument, it is of importance both to have a good illumination, and to have the patient in good position. In adults the operation can often be done under local anesthesia if the pharynx and larnyx have been well cocainized, but in children an anesthetic

must always be given. In the adult, when local anesthesia is used, the patient may be in the sitting posture, or in Roser's position with the head bent well backward; when the patient is under anesthesia, he must always be on the back with head well depressed beyond the end of table. Upper bronchoscopy—the passage of the tube through the larynx—may be tried in adults and older children, but in young children the rima glottidis is so small that a tube of sufficient size cannot be passed. In the latter, lower bronchoscopy is indicated—the passage of a tube through a tracheotomy wound. During the past two years we have had three patients with foreign bodies in the bronchus, and in all of them we did tracheotomy and lower bronchoscopy. Two cases were in children and the third in an adult. In all of the patients, the foreign body was seen and removed. All of the patients recovered.

Case 1.—Child, 4 years of age; shawl pin in right bronchus for three days; cough and expectoration, physical signs of obstruction of a bronchus with signs of pulmonary consolidation; pin located by X-ray; tracheotomy; difficulty in removing pin on account of impaction of the point in the tracheal wall; extraction sucessfully accomplished; recovery.

Case 2.—Child, 2 years of age; shawl pin in primary division of right bronchus for three days; located by X-ray; physical signs of bronchial obstruction; no other symptoms; tracheotomy, introduction of tube; location of pin and removal; uneventful recovery.

Case 3.—Female, 29; turkey bone in left bronchus for four months; continual cough with profuse purulent expectoration and loss of flesh and strength; first treated for hysteria; physical signs of obstruction of bronchus; X-ray examination negative; signs of bronchitis; tracheotomy, introduction of tube and location of bone in secondary division of left bronchus; extraction; recovery; some cough persistent on account of bronchial dilatation and inflammation.

Esophagoscopy was done once on account of a foreign body—open safety pin—in the upper part of the esophagus. It was found impossible to remove the pin through the esophagoscope; its extraction was easy through an external esophagotomy wound. The child, nine months of age, made an uneventful recovery.

The surgeon should know how to use the esophagoscope and the bronchoscope as well as he knows the endoscope, proctoscope and cystoscope, and these instruments should form a regular part of his instrumentarium.

The synopsis of a second case—one of coin in the gullet—follows:

Foreign body impacted in esophagus; esophagotomy and extraction of foreign body; cure.—Henrietta S., aged five, was admitted March 8th, 1905. The previous day the child had swallowed a cent. She had vomited frequently since, and complained of a choking sensation. Nothing was palpable, but the coin, lying at the root of the neck, just above the sternum between the inner ends of the clavicles, was very clearly shown by the fluoroscope.

On March 8th, the esophagus was opened on the left side at the root of the neck, the foreign body located with the aid of a rubber catheter in the esophagus and removed with forceps. The patient was discharged on March 22d, with a small granulating wound, no leakage, no regurgitation. On April 3d the child was brought back with a small persistent sinus in lower angle of wound. The sinus was touched with the actual cautery, under gas anesthesia and the child sent home.

Sarcoma of left side of face; ligation and excision of right external carotid and branches and of left common carotid; death.—Fredericka K., aged 54, admitted Jan. 30th, 1906. Fourteen months before admission, left side of face beneath eye began to swell and was red and tender. Swelling progressively increased, encroaching upon left eye and left side of nose, until patient was unable to see or to breathe through left nostril. Voice had a slight nasal twang. There was some loss of weight. Pathological report of specimen of growth was periendothelial sarcoma (Dr. Mandlebaum).

On January 30th the common carotid artery was exposed through a long incision, and the external carotid, lingual and facial arteries were excised.

The patient stood the operation well. On February 9th, left common carotid was exposed. The external carotid, superior thyroid, lingual and facial arteries ligated, the internal carotid ligated above the bifurcation and the common carotid below; the bifurcation was then excised.

The patient never regained consciousness after the operation; in spite of active stimulation she died on February 11th. No autopsy.

Deep Abscess of Neck Ulcerating into Common Carotid Artery; Edema of Larynx; Tracheotomy; Death.—Abe, G., aged 27 months, was admitted March 14, 1905, in poor condition. Seven days before the cervical glands had become enlarged and painful. On the day of admission, the swelling had suddenly increased very much in size. On admission there was a swelling with expansile pulsation extending from just above the level of the angle of the jaw almost down to the clavicle. As there was considerable difficulty in respiration the patient was at once taken to the operating room and the swelling aspirated.

Bright blood was obtained and active bleeding followed. An incision was made, the bleeding controlled by gauze packings and an attempt made to expose the trachea. Very active hemorrhage ensued which was only stopped by a ligature hastily passed around the entire mass in the neck. The trachea was then exposed by incising the thyroid gland, and tracheotomy done. The trachea was displaced 1¼ inches to the right and was difficult to locate owing to the great swelling of the tissues. After the tracheal canula had been inserted, the dyspnoea was relieved. The entire wound was packed with gauze and a dry dressing applied. Next day, the patient's condition continuing poor, further operative interference was contemplated, but the patient suddenly went into collapse followed shortly by death.

Autopsy (wound examination) showed a large aneurysmal sac occupying the anterior triangle of the neck enclosed in a mass of acute and chronically inflamed tissue. In addition there was marked edema of both vocal cords (Dr. Buerger).

Cervical Rib. Excision. Cure.—Francis B., aged 33 years, was admitted December 9, 1904. One year before the patient had begun to have cramp-like pains in the left shoulder and neck, paroxysmal in character, worse at night and radiating down the arm to the finger-tips. The pain had steadily become more severe and constant.

On admission there was found one-half inch above the clavicular attachment of the trapezius, a hard mass which was diagnosed as a cervical rib. Pressure on this mass caused shooting pain down the left shoulder and arm to finger tips. The left pulse was weaker and of smaller calibre than the right. The subclavian vessels were more prominent and higher on the left than on the right side. Auscultation revealed a distinct bruit. The left pulse disappeared with every deep inspiration. An X-ray picture clearly demonstrated a thick, strong cervical rib connected with the first rib by bone. Besides the articulation with the vertebra there was a well marked joint at about the middle of the cervical rib.

On December 14, 1904, an incision was made down to the bone, the scalenus anticus muscle cut from its attachment along the rib, and the bone divided with forceps. The upper part was twisted off from the vertebra and showed a well developed head and neck. The lower portion was freed down to a point below the subclavian vessels and was here divided with bone forceps. There was firm bony union with the first rib.

The progress of healing was uneventful. Immediately after the operation the tingling sensations were somewhat increased but the pulse remained normal on deep inspiration. Indeed, the change in the pulse was noted on the operating table. After cicatrization was

complete the irregularity on deep inspiration returned but the other symptoms disappeared. It is to be hoped that on atrophy of the scar the pulse will again become normal.

Aneurysm of Right Subclavian Artery. Ligation of Right Subclavian and Common Carotid Arteries after Incision of Aneurysmal Sac. Cure.—Reported in detail by Dr. Lilienthal, in the Journal of the Am. Med. Ass. for 1906.

SOLITARY ABSCESS OF THE LIVER.*

A CONTRIBUTION TO THE PATHOLOGY, DIAGNOSIS, AND TREATMENT OF THIS DISEASE, BASED ON THE STUDY OF EIGHTEEN CASES.

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During the last decade the literature on abscess of the liver has grown to very large proportions. Especial attention has been paid to the so-called tropical abscess, and the symptoms and treatment of this affection have been carefully studied. There has been considerable confusion, however, in the meaning of the term "tropical abscess." Some writers have called every single abscess a tropical one, while others have limited the term to solitary abscesses which occurred in the tropics. It would be preferable, I think, to limit the term "tropical abscess" to those cases which occur in individuals who have lived or are living in the tropics and in whom there is a preceding history of amebic dysentery, although it might be allowable to include under the same head amebic abscesses of the liver which occurred in the temperate zones.

The term "tropical abscess" is also frequently used to distinguish the solitary from the multiple abscesses of the liver. This is not strictly correct, because not a small number of amebic abscesses are multiple. It is more correct to speak of single or solitary and of multiple abscesses of the liver, and to include under each of these heads the different varieties of abscesses classed according to their etiology. Under the head of single or solitary abscess of the liver would therefore be grouped the following:

1. The tropical abscess, following tropical dysentery. This is associated with the presence of the ameba coli, and is said to follow rarely dysentery due to Shiga's bacillus (dysenteric abscess of Kartulis[37]).

*Reprinted from Annals of Surgery, August, 1906.

2. The traumatic abscess, either as a secondary infection of a hemorrhage into the liver substance, or by direct infection from the surface of the body.

3. The pyemic abscess, as a part of a systemic pyemia. With this is not necessarily associated a bacteriemia (Libman).

4. Liver abscess secondary to a variety of abdominal affections. In this form the connection between the abscess and the primary disease is often in doubt. The infection is probably carried to the liver by the portal vein (idiopathic abscess of Kartulis).

During the last five years, 18 patients with solitary liver abscess were operated upon in the Second Surgical Service at Mt. Sinai Hospital.* In the majority of the patients the source of the infection could not be determined with certainty, although in a number of them there was a history of some preceding disease. These cases form the basis of the present paper.†

In 12 of the 18 patients there was a history of a preceding disease, viz.:

Trauma (gunshot wound) in one patient.
Cholelithiasis in one patient.
Chronic colitis in one patient.
Acute appendicitis in one patient.
Osteomyelitis of tibia in one patient.
Hemorrhoids in two patients.
Intermittent fever in two patients.
Occasional diarrhea in three patients.

In the six other patients there had been no previous illness.

The history of the patient who had a solitary abscess of the liver after an attack of acute appendicitis follows:

Jacob E., 40 years of age, was admitted to the hospital on July 23, 1902. He had been operated on for an inguinal hernia six weeks before and for acute appendicitis three weeks before at another hospital. Very little of the history of the present illness could be obtained from the patient. He declared that for two weeks he had had chills and fever, with pain in the right hypochondrium.

*Eight cases were operated upon by Dr. Lilienthal, four by Dr. J. Wiener, six by Dr. Elsberg.

†Two cases of suppurating gumma of the liver and one of suppurating echinococcus cyst are not included. Six cases of multiple abscesses of the liver are referred to later.

Condition on admission, markedly emaciated. Examination of the chest reveals the following: In front there is dulness at the second right intercostal space, flatness from the fourth interspace to the base of the lung, with absence of voice and breathing. Posteriorly, there is flatness on percussion from the angle of the scapula to the base of the lung, with absent voice and breathing below the fifth interspace. Lower intercostal spaces on the right side very tender; area of marked tenderness below angle of scapula. Abdomen: unhealed wound in the right iliac region from which there is a moderate purulent discharge; percussion shows the liver to be enlarged upwards and downwards, lower border two finger-breadths below free costal margin; abdomen rigid, distended and tympanitic. Aspiration in ninth space post-axillary line gave thick non-odorous pus.

July 23, under ether anesthesia, three inches of the ninth rib were resected (Dr. Elsberg), the pleural cavity, which contained clear serum, was opened and walled off with gauze as no sutures would hold, the diaphragm incised, and 54 ounces of pus evacuated. The subphrenic abscess was found to communicate with a large cavity in the right lobe of the liver; drainage.

Convalescence was uneventful; the temperature, which had been high, soon fell to the normal, and the patient was discharged cured twenty-four days after the operation.

Cultures made from the pus remained sterile; no amebæ could be found in the discharge from the wound.

While subphrenic abscesses and multiple abscesses of the liver are not so very rare after acute appendicitis—subphrenic abscess occurs in 2½ per cent. of the patients (Elsberg[1]); multiple abscesses of the liver in 0.8 per cent. (Gerster[2]); solitary abscesses are very infrequent. Thus I have been able to find only 14 cases in medical literature although there have no doubt been a larger number (Cases of Herczel,[3] Chvostek,[4] Munro,[5] Sheen,[6] Koerte (2),[7] Delageniere,[8] Loison,[9] Jones,[10] Norton,[11] Sonnenburg,[12] Hildebrandt,[13] Shoemaker,[14] Besancon[15]). The patient of Delard,[16] often referred to, probably had only a subphrenic abscess, and one of Koerte's[7] patients had multiple abscesses.

Infection may reach the liver from the appendix or from another part of the abdominal cavity in one of several ways: (1) By direct extension, either through the bile-ducts or from abscesses in close proximity to the liver (subphrenic, perinephritic); (2) by the lymphatics; (3) through the arteries, as part of a systemic infection; (4) through the portal vein.

Koerte[17] and Loison[18] believe that hepatic suppuration often results from the direct extension of the suppurative process from the appendix region through the retroperitoneal cellular tissue. To judge from the cases of liver abscess reported in literature, this is not as frequent as these writers would lead us to believe. Loison states, in support of his view, that where there is a subphrenic abscess with a liver abscess it is impossible to say whether the liver abscess perforated the capsule of Glisson and became perihepatitic or whether the latter perforated the capsule of the liver and caused the hepatic abscess. Munro voices his belief that a considerable number of liver abscesses are due to extension to the perihepatic region through the lymphatics, while on the other hand Jones[19] denies that there are any lymphatics that run directly to the liver. The opinion of most writers seems to be that while infection of the liver through the lymphatics and from the perihepatic regions is possible, it is not of frequent occurrence.

In the majority of cases solitary abscess of the liver after appendicitis is due to bacteria or their products that are carried to the organ through the portal vein. Loison has pointed out that the organisms may travel up the vein and set up the liver suppuration without leaving behind demonstrable changes in the vessel or its large branches.

Whether the abscess be a single one or multiple will depend not only upon the number of organisms that are carried to the liver, and their virulence, but also upon whether the infectious material is diffused over a very small area of liver substance in one lobe, or is spread over the greater part of one or of both lobes of the liver. In a certain number of cases the single abscess may be due to the confluence of several small abscesses in a lobule of the organ. Clark,[20] Windsor,[21] Loison and others have shown that the solitary tropical abscess is often due to the merging of numerous smaller abscesses. Hence if the organisms that have entered the portal vein are carried to one or a few of the terminal branches of the vein, the abscess may be a solitary one, but if the septic matter is carried into a large number of branches multiple abscesses will ensue.

It is perfectly possible for a lesion in the gastro-intestinal tract which gave no symptoms to contribute sufficient infectious matter

to cause in this way a single abscess of the liver. I believe that this is the explanation for many if not most of the single abscesses of the liver that are seen in the temperate zones, whose etiology has not been determined.

Location of the Abscess.—In 16 of our 18 cases, the abscess was located in the right lobe, and with one exception in the upper part of the right lobe. According to Rolleston,[22] 80 per cent. are in this situation, while Jones states that only 6 per cent. occur in the left lobe. The more frequent affection of the right lobe is due to the fact that the branch of the portal vein that supplies the right lobe of the liver is larger, shorter. and more direct than the left branch.

The size of the abscess and the amount of pus it contains vary within wide limits, the largest quantities being found in the cases in which the abscess has secondarily invaded the subphrenic space.

The contents of the abscesses were of a yellow, brownish red or green color, and usually thick and of a mucoid consistency. In four of our cases the pus had a foul odor,—three were cases with subphrenic abscess, and in the fourth case the odor was probably due to the presence of anerobic bacteria.

Our records are unfortunately incomplete as regards the organisms found in the pus, as no cultures were taken in some of the early cases. Of the 10 cases in which examinations were made, the pus was sterile in six (60 per cent.), which corresponds pretty closely to the results of Giordano[23] who examined 72 cases and found the pus sterile in 58.4 per cent. The staphylococcus citreus was present once, streptococcus once, bac. coli once, anerobes once. A careful search for the amebæ coli was made in all of the cases but they were found only once.

The hepatic abscess had burst into the subphrenic region in six of the 18 patients (33 per cent.). The pleural cavity contained clear serum in four patients, it was normal in three, it could not be examined in 10. Perforation of the diaphragm did not occur a single time.

Symptomatology.—The symptoms of solitary abscess of the liver may come on days, weeks or months after the primary disease. After having been well marked they may disappear for a time, the dormant

stage of liver abscess. Several modes of onset are, however, characteristic.

I. *Acute Onset.—(a)* With or without a history of previous illness, the patient is suddenly attacked with pain in the lower part of the right or left chest, chills, fever, sweating, a dry cough, and marked prostration. The chills or chilly sensations are repeated daily, the pain persists, there is very rapid emaciation, the liver becomes enlarged and tender. *(b)* The patient is suddenly attacked with pain in the epigastrium and right or left hypochondrium, fever, cough, prostration. These symptoms increase in severity, and tenderness and muscular rigidity in the upper part of the abdomen soon appear. The liver becomes enlarged and tender, and the patient presents the picture of an acute abdominal infection. The abdominal type of onset.

II. *Subacute or Chronic Mode of Onset.—(a)* Without any previous disease or a number of years after some illness, the patients begin to have a dry cough, complain of a heavy feeling or slight pain in the lower part of the right or left chest, and begin to lose flesh and strength. After weeks or months, during part of which time the symptoms may be in abeyance, the temperature begins to rise and soon becomes of an intermittent type, chills or chilly sensations with sweats occur, and the liver becomes enlarged and tender; or *(b)* The mode of onset is similar to that of subphrenic abscess. The patients have an irregular fever as the first symptom, and then lose flesh and strength rapidly. These patients may show no local signs of their disease until the abscess invades the subphrenic region. Without any change in the temperature, respiration or pulse, some patients complain of continual slight pain in the right or left chest. The pain persists for weeks or months. Physical examination of the chest results negatively, and the patients never look very ill. Sooner or later the pain in the chest becomes more severe, there is enlargement of the liver, dulness, perihepatitis, and signs of fluid in the pleural cavity of the affected side. Then the presence of fluid under the diaphragm and perhaps in the pleural cavity is found by physical examination and the aspirating needle.

A detailed account of the various symptoms and signs that may

be present in this affection would occupy too much space. Mention will only be made of some of the more important ones:

Pain, fever, enlargement of the liver, and emaciation are the characteristic symptoms of abscess of the liver, although one or more of these may be absent.

Acute pain may be absent entirely or may only appear late in the disease. It is not apt to occur as early as in subphrenic abscess, and is due in most cases to the perihepatitis which follows when the suppuration nears the surface of the liver. The pain is usually referred to the region of the liver and more especially to the lower part of the right or left chest in front. The patients most often complain of pain along the free costal border or within an area situated between the mammary and posterior axillary lines. These localized areas of pain usually correspond to the points of greatest tenderness on pressure (Smits,[24] Koerte, Godlee,[25] etc.).

The tenderness along the free border of the ribs is usually most marked in the mammary line, but with marked abdominal rigidity it may be impossible to localize the point of maximum tenderness in this region. The other area of tenderness is obtained by pressure in the intercostal spaces between the eighth and the eleventh ribs on the right side, or below the ninth rib on the left side, somewhere between the anterior axillary and the scapular lines. Increase of the tenderness in this or in the infracostal region usually means that the abscess is approaching the upper or lower border of the liver or both. In some cases (two of our series) there was bulging in some of the lower intercostal spaces.

Pain in the shoulder was present in only four of the eighteen patients. Some writers, if not most of them, lay great stress on this symptom. Kramm[26] declares that it was present in 50 per cent. of his cases (tropical abscess), while it was said to have been almost the only symptom in a patient of Bramwell and Stiles.[27] On the other hand, pain in the shoulder was mentioned only twice in the 28 cases reported by Hart.[28]

Enlargement of the liver may be absent if the abscess be a very small one, but there is usually more or less increase in the size of the organ. The liver was enlarged in all but one of our cases. It was enlarged both upwards and downwards, although it was some-

times difficult to map out the upper border of the organ with certainty in the presence of a subphrenic abscess or of fluid in the pleural cavity. The lower border of the liver was enlarged downwards in 17 of the 18 cases, and in all but two of these it was plainly palpable. Perthes,[29] speaking of the tropical abscess, says that even with an abscess of considerable size in the right lobe there may be no enlargement downwards, while Kiefer,[30] from his large experience, declares that enlargement downwards is not the rule. The only explanation that I can offer for the difference between the abscesses we have observed and those described by the above-mentioned writers is that in tropical abscess enlargement of the liver is not as frequent as in the abscesses here reported. The upper level of liver dulness is usually a curve, with its convexity upwards, which does not change with change in the patient's position. This convexity is, however, wanting when there is fluid in the pleural cavity.

Fever was present in every one of our cases. It usually ran an irregularly intermittent course, and in nine of the 18 cases was accompanied by chills or chilly sensations and sweats.

A marked and rapid loss of flesh and strength was one of the chief complaints in 11 out of 16 patients. It was not unusual for the patients to have lost ten to twenty pounds in one or two weeks.

Cough without or with slight expectoration was noted in six of the 18 patients (33 per cent.).

Jaundice occurred only twice among the patients, although most of the patients had a characteristic sallow, yellowish color. In this connection it might be mentioned that excepting in the two patients with jaundice above mentioned, we have never been able to find bile in the urine. Wendel,[31] however, declares that he always found bile pigments in the urine in tropical abscess.

In every one of our cases in which a white blood-count was made there was a leucocytosis—the smallest number of white cells in the cm. was 8100, and the largest, 34,500.

Diagnosis.—The greatest difficulties in diagnosis are encountered in the effort to differentiate between a single abscess and multiple abscesses, between liver and subphrenic abscess, or liver with subphrenic abscess. In many cases the differential diagnosis is impossible before the operation; a pleurisy with effusion or empyema and a sub-

phrenic abscess may be recognized, while the underlying cause of the condition—the hepatic abscess—remains unrecognized. The first point to determine is whether the affection is above or below the diaphragm or whether there is disease in both these regions—in other words, is there a pleural effusion alone, or a subphrenic or liver affection alone, or are both combined? The physical signs of pleurisy with effusion and of empyema need not be described here; mention will be made of only a few signs that are of diagnostic value. With a beginning pleural effusion there are more apt to be symptoms which point to an affection of the chest,—rapid respiration, cough, expectoration; the level of the dulness is generally concave upwards, and the upper border of the dulness changes distinctly with a change in the position of the patient.

When there is a well-marked effusion under the diaphragm there are usually few or no thoracic symptoms; the upper level of the dulness is a straight line, or is convex upwards, there is little change in the line of dulness with a change in the position of the patient. In pleural effusions the respiratory murmur is much diminished or absent below the level of the fluid, while in subphrenic or hepatic abscesses the murmur can generally be plainly heard below the level of the fluid. The heart is never appreciably pushed to the right. The greatest difficulties in diagnosis are met with in the cases in which a pleurisy with effusion is associated with a collection of pus underneath the diaphragm in the liver or in the subphrenic region. When the subphrenic abscess contains gas, the diagnosis of the two associated conditions is possible. In the upper part of the chest there are then the signs of pleuritic effusion, and below these the signs of an effusion containing gas. When the quantity of fluid in the pleural cavity is considerable, it may be impossible to make the diagnosis of a primary subphrenic abscess, or subphrenic secondary to liver abscess, or of primary liver abscess, except from a careful study of the patient's history and by means of the aspirating needle. If pus is withdrawn by aspiration through one of the lower intercostal spaces and clear fluid by aspiration higher up, the diagnosis of an association of two conditions is almost assured.

We have not found Litten's diaphragm phenomenon of much diag-

nostic significance, for it can be found to be present in many normal individuals.

According to Fuerbringer,[32] the motions of an aspirating needle introduced into the abscess are pathognomonic. Fuerbringer claimed that during inspiration and expiration an exploring needle which had been introduced to below the diaphragm would move in the opposite direction to what it would do if it were in the pleural cavity. The movements of the diaphragm are often greatly impaired, especially when the diaphragmatic is adherent to the costal pleura and the costophrenic sinus obliterated. We have found this sign, however, of considerable value when it was present.

Localized edema of the chest-wall, if present, is of importance, since it shows that the abscess is approaching the surface of the body.

The differential diagnosis between subphrenic abscess and abscess of the liver is very difficult and often impossible. In both affections the liver dulness is increased upwards and downwards and limited above by the diaphragm; in both is the lowermost level at which the respiratory sounds can be heard below the level of dulness; the clinical symptoms of hepatic abscess may be in all respects like those of subphrenic disease, or the latter is present secondary to a liver abscess.

As I have already shown, solitary abscess of the liver after appendicitis is rare as compared with subphrenic or multiple hepatic abscesses. Accompanying disease of the pleura (serous, sero-purulent or purulent effusion) is more rare in hepatic abscesses than in those in the subdiaphragmatic region. (The pleura was the seat of secondary inflammation in about 50 per cent. of the cases of subphrenic abscess collected by the writer.) For a number of other facts of diagnostic value for the differentiation between subphrenic and liver abscess the reader is referred to a paper on subphrenic abscess published a few years ago (*Annals*, December, 1901).

The differential diagnosis between solitary and multiple abscesses of the liver is impossible in many if not most of the cases, although sometimes a careful consideration of the etiology and the course of the disease may result in the making of a correct diagnosis. Appendicular disease and affections of the gall-bladder and bile-ducts are more apt to be followed by multiple hepatic abscesses. The presence

of fluctuation in the intercostal spaces or in the hypochondrium points rather to solitary abscess. Enlargement of the spleen occurs more often in multiple abscesses. Multiple abscesses of the liver are very apt to give marked symptoms early when the suppurating areas are still small, so that in a case where all of the symptoms and signs pointed to suppuration in the liver, negative results of repeated aspirations should make one think of the greater probability of multiple abscesses. Although there may be a well-founded suspicion that there are numerous abscesses, the patient should always (if the general condition permits it) be given the benefit of the doubt and operative interference be instituted as soon as pus has been found by the aspirating needle. Although, in a very few cases, a cure has followed the drainage of a number of abscesses of the liver, the presence of multiple abscesses is usually a fatal complication.* The danger from repeated aspirations of the liver, however, is not very great if one is prepared to follow at once with the operative interference.

There are several other conditions with which abscess of the liver may be confused, and which must be mentioned here. The differentiation of simple abscess from suppurating echinococcus cyst may be impossible until pus has been found with the aspirating needle and the characteristics hooklets have been found in it by the microscope. A previous history of liver tumor which has existed for many years before the onset of the present symptoms, may be of diagnostic value.

Metastatic carcinoma of the liver may cause enlargement and tenderness of the organ and is often accompanied by an irregular intermittent fever. During the past year there have been two patients on the Second Surgical Service at Mt. Sinai Hospital with metastatic carcinoma of the liver,—secondary to malignant disease of the rectum in the one case, and of the breast in the other. Both patients had enlarged and tender livers and for a number of weeks an irregular fever of between 100° and 104°. A history of preceding malignant disease in some other part of the body, or its demonstrable presence,

*In the cases of this kind, there were usually two or three large abscesses which were successively opened and drained. There is to the best of my knowledge not a single case on record where recovery has resulted in the presence of innumerable large and small abscesses scattered over both hepatic lobes, as are found in most cases of multiple abscesses of the liver.

a hard palpable tumor of the liver, cachexia, and the absence of a marked increase of polynuclear leucocytes in the blood, are of diagnostic value. The differential diagnosis can usually be made without recourse to the aspirating needle. The diagnosis of gumma can usually be made from the history. Other conditions that may have to be differentiated from abscess of the liver are malarial fever, intermittent hepatic fever due to infective cholangitis, abscess of the spleen (when the hepatic abscess is in the left lobe) and, rarely, large abscess of the kidney.

Prognosis.—The mortality after operations for solitary abscess of the liver is not as large as one would expect in view of the serious nature of the disease and the importance of the organ affected. Of the eighteen patients in our series five died (28 per cent). Kieffer[33] believes that if the patients come to fairly early operation, 90 per cent. should recover.

Most operators have a mortality of between 20 per cent. and 50 per cent., although Smits[34] saved 18 out of 21 patients by early operation. Of 182 cases collected by Perutz[35] 44 died, a mortality of 24 per cent. From the cases we have seen we have gained the impression that the prognosis of amebic abscess of the liver occurring in temperate zones is not as good as the prognosis in single abscess associated with the presence of other organisms.

Treatment.—Whenever, after an acute abdominal affection, in which the local symptoms have been relieved, there are chills, intermittent fever, and rapid emaciation, it is important to examine the liver very carefully from day to day and to keep the possibility of a suppurative process in that organ in mind. As soon as the signs justify aspiration of the liver, this should be done, and when pus has been discovered, there should be no delay before operation is done. In rare cases, the symptoms and signs of liver suppuration may be so clear, and the rapid deterioration of the patient's condition so evident, that even when repeated aspirations have resulted negatively, an exploratory operation is justifiable. The following case of this nature is of sufficient interest to be reported in detail in this place:

Rebecca R., 32 years of age, was admitted to the Second Surgical Service of Mt. Sinai Hospital, on July 5, 1904. Twelve hours before,

the patient had received a bullet-wound in the upper part of the right chest. It had been supposed by the physician who saw her at the time that the wound was only a superficial one. As her general condition was becoming steadily worse, she was brought to the hospital.

On admission, she was almost in collapse; the pulse was very small and rapid; the tongue dry and coated; just above the right breast in the fourth intercostal space was a small punctured wound with a large area of ecchymosis around it. The abdomen was generally distended and tympanitic; everywhere tender and rigid, but the rigidity and tenderness most marked in the epigastric and left hypochondriac regions. There was a normal area of liver dulness, but there was some movable dulness in the left flank.

The patient complained of severe cramp-like pain in the upper part of the abdomen but she could not localize it on one or the other side.

On the suspicion of an abdominal injury, she was at once taken to the operating-room for operation (Dr. Elsberg). Under ether anesthesia the point of entrance was first carefully probed. The probe passed downwards and to the left to the lower part of the sternum, where the bone was found to be bare. An incision was made at this point, and it was then found that the bullet must have passed downwards into the abdominal cavity.

The abdomen was then opened by a median incision above the umbilicus. When the peritoneum was incised, a large quantity of dark blood escaped, together with a little gas. On the under surface of the left lobe of the liver was a large irregular lacerated wound from which there was a continual oozing of dark blood. The wound was packed with gauze, and opposite it on the anterior wall of the stomach was a perforation of that organ about one cm. in diameter from which fluid stomach-content was escaping. The perforation was closed by a double layer of Lembert sutures. The lesser peritoneal sac was then opened by an incision along the greater curvature of the stomach. The lesser sac was clean, nor did careful examination of the posterior wall of the stomach reveal a wound in its wall. There was a large collection of blood around the lower part of the kidney.

The patient was, at this stage, in such poor condition that further interference was considered contraindicated; the liver wound, the suture line on the anterior wall of the stomach and the region of the left kidney were drained with gauze, the abdominal cavity carefully sponged clean and the greater part of the abdominal wound closed by layer sutures. The wounds in the chest-wall were drained. The

patient was removed to her bed with a pulse of 180, but she improved rapidly under energetic stimulation.

From this time up to July 23 the patient steadily improved; the temperatures varied between normal and 101°, the pulse between 100 and 120. The wounds healed up slowly, with but little discharge.

July 23.—Severe chill followed by temperature of 104° and pulse of 140; few friction sounds over left base behind; leucocytes 17,000.

July 24.—Dulness from spine of scapula to base of left lung behind, with bronchial breathing, and almost absent voice and fremitus; aspiration of left chest negative.

July 26.—Rapid pulse has persisted with intermittent high temperatures; almost daily chills; physical signs over lower part of left chest the same as when last noted except that dulness now extends to middle of scapula behind; clear fluid, withdrawn from left of chest with aspirating needle, was sterile on culture.

August 4.—The patient's condition has grown steadily worse, high temperatures and rapid pulse persist; the signs over the lower part of the left chest the same as when last noted; the patient is much emaciated; there are irregular chills with sweats; leucocytes 23,800. The left lobe of the liver is slightly enlarged downwards and is tender. The left lobe of the liver was aspirated almost daily but no pus could be found. X-ray showed the bullet between the ninth and tenth ribs behind, probably in the left subphrenic region.

August 6.—In spite of active stimulation, the patient is very weak to-day; she had a severe chill this morning, after which the pulse was almost imperceptible for several hours. The left lobe of the liver and left subphrenic region were aspirated in all directions, but the results were negative.

As the patient seemed almost moribund, and because of the probability of suppuration around the region of the bullet, it was determined to do an exploratory operation as a last resort. Under a light chloroform anesthesia, three inches of the ninth rib on the left side were resected, the diaphragm exposed by pushing up the reflexion of the pleura, and the left lobe of the liver aspirated; the first aspiration withdrew thick grey pus. The diaphragm was then incised and the liver again aspirated. This time yellow pus was obtained. With the needle as a director the abscess of the liver was opened with a grooved director and dressing forceps and about two ounces of yellow pus evacuated. On account of the different character of the pus obtained at the first aspiration, the left subphrenic region was again aspirated, thick grey pus obtained, and a small subphrenic abscess opened and drained. By this time the patient was in very poor condition, so that no search could be made for the

bullet. The abscesses were drained and the patient put upon energetic stimulation.

On the following day the patient's condition was much improved and the improvement thereafter was a slow but continued one. The temperature and pulse reached the normal after one week; she began to gain flesh and strength rapidly. Thirteen days after the operation the bullet was felt with a probe introduced into the sinus leading into the left subphrenic region, and after some difficulty was removed. It was of 38 calibre.

December 16.—The patient has gained 40 pounds in weight, all wounds are healed and on this day she was discharged from the hospital cured.

Cultures from the pus withdrawn from the abscess of the liver contained the streptococcus.

Remarks.—The interesting feature of this case, aside from the severe nature of the injuries and the recovery of the patient, was the fact that repeated aspirations never disclosed the pus in the left lobe of the liver and the left subphrenic region, although the physical signs, the presence of fluid in the left chest, and the probable location of the bullet by the X-ray in the left subphrenic region, pointed to an abscess in that location.

The exposure of a lobe of the liver and the adjoining subphrenic region can be made by one of two routes,—either by transpleural or infrapleural thoracotomy, or by an abdominal incision through the right or left rectus muscle. The abdominal operation must be retained only for those cases in which the symptoms and signs point to an abscess approaching the under surface of the right or left lobe of the liver, and in those in which there are mainly abdominal symptoms.

In the large majority of the cases, however, the abscess is located in the upper part of the liver and had best be approached through the wall of the chest. The technique of infrapleural or transpleural thoracotomy will not be described here, as the writer has described the typical operation in detail in a paper on subphrenic abscess *(Annals of Surgery,* December, 1901). I desire, however, to again lay stress upon one point in the technique of the transpleural operation which seems to me of great value, but which as yet has not been given the prominence it deserves.

In the transpleural operation (if the costo-phrenic sinus has not

become obliterated by adhesions) the suture of the diaphragmatic to the costal pleura after the incision of the latter can often not be accomplished without the entrance of more or less of air into the pleural cavity. By means of upward pressure against the liver, however, it is usually possible to so closely approximate the diaphragmatic to the costal pleura that little or no air can enter the pleural cavity when the pleura is incised and while the two layers of the pleura are being united by suture. The writer has found this method of great value in preventing an acute pneumothorax where there are no adhesions.

When the diaphragm has been incised, and there are no adhesions between it and the liver, the peritoneal cavity must be carefully walled off on all sides by gauze packings (which must be allowed to remain undisturbed for six to ten days after the operation). The liver is then aspirated and when the pus has been located, a grooved director is pushed into the abscess along the needle, the canal dilated with dressing forceps, and the abscess drained according to general surgical principles. If the abscess is deeply situated in the lobe of the liver, it may be advisable to use the actual cautery on account of the danger of hemorrhage. In most instances the careful dilatation with the dressing forceps is all that is required.

When the abscess has burst into the subphrenic region, all that is necessary is to drain the subphrenic space after having made sure by digital exploration that the opening into the liver abscess is large enough to allow of free drainage. The liver has often to be drained separately with a large tube.

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GYNECOLOGICAL SERVICE.

From December 1, 1904, to December 1, 1905.

JOSEPH BRETTAUER, M. D.
GYNECOLOGIST.

S. M. BRICKNER, M. D.,
ADJUNCT GYNECOLOGIST.

Patients admitted		433
Diseases treated		586
Cured	497	
Improved	40	
Unimproved	13	
Died	14	
Number of operations		559

DISEASES.

	Unimproved.	Died.	Not operated.	Cured.	Improved.	Total.
Vulva (3 cases).						
Venereal warts	..	1	..	..	..	1
Abscess of Bartholinian gland	..	1	..	..	..	1
Atresia hymenalis	..	1	..	..	..	1
Urethra and Bladder (12 cases).						
Cystitis	2	2	1	..	..	3
" with asthenia and starvation	1	..	..	..	1	1
" " pyelitis	1	1	..	..	..	1
" " tuberculosis	1	1	..	..	..	1
Hematuria	1	1	..	..	..	1
Incontinence of urine	..	..	..	1	..	1
Gonorrheal urethritis	2	..	..	..	2	2
Urethral caruncle	..	2	..	..	..	2
Vagina (117 cases).						
Cystocele	..	49	..	..	..	49
Rectocele	..	62	..	..	..	62
Acute gonorrheal vaginitis	1	..	..	1	..	1
Laceration of vagina	3	3	..	..	..	3
Vaginismus	1	1	..	..	..	1
Congenital atresia of vagina	..	..	..	1	..	1

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Perineum (5 cases).						
Complete laceration of perineum	..	4	1	..	..	5
Rectum (13 cases).						
Hemorrhoids	..	12	..	..	..	12
Ischio-rectal abscess	..	1	..	..	..	1
Uterus (287 cases).						
Cervix (53 cases).						
Injuries: Lacerated cervix	2	39	1	1	..	41
Inflammations: Hypertrophied cervix	..	3	..	..	..	3
Cicatricial stenosis of cervix	..	1	..	..	..	1
New Growths: 1. Benign: Polyp	..	4	..	..	..	4
2. Malignant: Carcinoma	..	2	..	2	..	4
Body (236 cases).						
(a) *Abortions:* 1. Incomplete	..	31	..	..	..	31
2. Inevitable	..	3	..	..	..	3
3. Threatened	..	1	..	..	..	1
(b) *Inflammations:* 1. Post-abortive endometritis	..	6	..	..	..	6
2. Chronic endometritis	1	60	..	1	..	61
3. Metritis	..	1	..	..	..	1
4. Pyometritis	..	..	1	..	..	1
(c) *New Growths:* I. Benign: 1. Submucous polyp	..	1	..	..	..	1
2. Hydatidiform mole	..	1	..	..	..	1
3. Fibroid	1	45	3	3	..	51
4. Sloughing fibroid	..	1	..	..	..	1
5. Fibroid with dermoid	..	1	..	..	..	1
6. Fibroid with pelvic exudate and peritonitis	..	..	..	..	1	1
II. Malignant: 1. Carcinoma	..	1	..	..	..	1
2. Sarcomatous degeneration of fibroid	..	..	..	..	1	1
3. Sarcoma of vagina and fibroid uterus	..	..	1	..	..	1
(d) *Displacements:* 1. Anteflexion and stenosis	..	13	..	..	..	13
2. Retroflextion and retroversional	1	31	..	1	..	32
3. Prolapse	1	10	..	1	..	11
(e) *Malformations:* 1. Premature atrophy	1	..	..	1	..	1
2. Infantile uterus	1	..	..	1	..	1
(f) *Pregnancy:* 1. Simple	5	2	..	5	..	7
2. Hyperemesis	..	2	..	..	..	2
3. Pulmonary tuberculosis	..	..	2	..	..	2

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Body—*(Continued).*						
4. Endocarditis	..	..	2	..	..	2
5. Threatened eclampsia	..	1	..	..	..	1
6. Syphilis	..	1	..	..	..	1
Ovaries (39 cases).						
Cyst: 1. Simple	1	16	..	1	..	17
2. Simple bilateral	..	1	..	..	..	1
3. Dermoid	..	3	..	..	..	3
4. Dermoid, retro-peritoneal, in sacral hollow	..	..	..	1	..	1
5. Tubo-ovarian	..	1	..	..	..	1
Inflammations: 1. Abscess	..	1	..	..	..	1
2. Abscess with diseased appendages	..	1	..	..	..	1
3. Abscess with general peritonitis	1	..	..	..	1	1
4. Abscess with recto-vaginal fistula	..	..	1	..	..	1
5. Abscess, tubo-ovarian	..	2	..	..	..	2
6. Double tubo-ovarian abscess	..	1	..	..	..	1
New Growths: 1. Carcinoma	2	..	..	2	..	2
2. Left papillary cyst and right tubo-ovarian cyst	..	1	..	..	..	1
Displacements: 1. Prolapse	4	2	..	4	..	6
Tubes (45 cases).						
1. Pyosalpinx, unilateral	1	3	1	1	..	5
2. Pyosalpinx, bilateral	..	1	1	..	..	2
3. Pyosalpinx with intestinal obstruction	..	1	..	..	..	1
4. Hydrosalpinx	1	1	..	1	..	2
5. Hematosalpinx	..	1	..	..	..	1
6. Diseased appendages with peritonitis	..	..	..	..	1	1
7. Ectopic pregnancy	..	15	..	..	..	15
8. Acute salpingitis	3	..	3	..	..	3
9. Diseased appendages	7	8	7	..	..	15
Pelvic Peritoneum and Cellular Tissue (25 cases).						
Pelvic abscess	..	9	..	..	..	9
Exudate	3	1	1	1	..	3
Hematocele	..	4	1	..	..	5
Parametritis	3	2	1	1	..	4
Pelvic peritonitis	3	1	3	..	..	4
Miscellaneous (40 cases).						
Acute gangrenous appendicitis with abscess	..	1	..	..	..	1
" " perforating appendicitis with serous peritonitis	..	1	..	..	..	1
Chronic appendicitis	..	4	..	..	..	4

Miscellaneous—*(Continued).*	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Retained secundines	..	1	..	..	..	1
Cyst of canal of Nuck	..	1	..	..	..	1
Ventral hernia	..	2	..	..	..	2
Infant pulmonary atelectasis	1	..	..	..	1	1
Suppurative axillary lymph-adenitis	..	1	..	..	..	1
Femoral phlebitis (post-partum)	1	1	..	..	..	1
General abdominal carcinomatosis	..	..	..	..	1	1
Neurasthenia	4	..	2	2	..	4
Palpable kidney	1	..	1	..	..	1
Intestinal obstruction	2	..	..	..	2	2
Chronic colitis	1	..	1	..	..	1
Inguinal hernia	..	1	..	..	..	1
Intra-abdominal abscess	..	1	..	..	..	1
Mammary fibroma	..	1	..	..	..	1
Cholecystitis	..	..	..	..	1	1
Lipoma of abdominal wall	..	1	..	..	..	1
Sinus of abdominal wall	1	1	1	..	..	2
Fibroma of abdominal wall	..	1	..	..	..	1
Femoral hernia	..	1	..	..	..	1
Post-partum neurosis	1	1	..	..	..	1
Streptococcemia	1	..	..	..	2	2
Vicarious menstruation	1	..	..	1	..	1
Diabetic coma	1	..	..	..	1	1
Enteroptosis	1	..	..	1	..	1
Sarcoma of inguinal glands	..	..	1	..	..	1
Carcinoma of axillary glands	..	..	1	..	..	1
Syphilis	1	..	1	..	..	1
Nephrolithiasis	..	1	..	..	..	1
Post-partum sepsis	..	..	..	..	1	1

Operations.

Vulva (3 operations).

Curetting of venereal warts	1
Incision and drainage of Bartholinian gland	1
Excision of hymen	1

Urethra and Bladder (4 operations).

Suprapubic cystotomy for cystitis	1
Cauterization of urethral caruncle	1
Urethroplasty for urethral caruncle	1
Gersuny operation for incontinence of urine	1

Vagina (112 operations).

Anterior colporrhaphy	49
Posterior "	62
Incision for complete congenital atresia of vagina	1

Perineum (5 operations).

Tait for complete laceration	4
Primary post-partum perineorrhaphy	1

Rectum (13 operations).

Clamp and cautery for hemorrhoids	12
Incision and drainage for ischio-rectal abscess	1

Uterus (274 operations).

Cervix (49 operations).

Trachelorrhaphy	30
Amputation	12
Curettage and Paquelinization	1
Exploratory laparotomy and Paquelinization of cervix	1
Excision of polypus	4
Complete abdominal hysterectomy for cicatricial stenosis	1

Body (225 operations).

Normal delivery	2
Induced abortion for hyperemesis, tuberculosis, endometritis and syphilis	8
Accouchements forcés for hyperemesis	2
Curettage for incomplete, threatened and inevitable abortion	35
" " post-abortive endometritis	6
" " endometritis	60
" and drainage for pyometritis	1
Excision of submucous polyp	1
Curettage for hydatidiform mole	1
Abdominal hysterectomy: 1. Fibroid uterus	36
2. Sarcomatous degeneration of fibroid	1
3. Sarcoma of vagina with fibroid uterus	1
Vaginal hysterectomy: 1. Metritis with arterio-sclerosis	1

Body—*(Continued).*

2. Fibroids	7
3. Carcinoma	1
Abdominal myomectomy	3
Vaginal myomectomy	1
Morcellement for sloughing fibroids	1
Curettage for fibroid	3
Dudley's operation for anteflexion and stenosis	13
Alexander's operation for retroflexion and retroversion	15
Ventral fixation for retroflexion and retroversion	16
" " " prolapse	10

Ovaries and Tubes, Pelvic Peritoneum and Cellular Tissue (80 operations).

Abdominal section for:	
Simple ovarian cyst	16
Bilateral ovarian cyst	1
Dermoid cyst	2
Tubo-ovarian cyst	1
Ovarian abscess	2
" " and diseased appendages	1
Tubo-ovarian abscess	1
Double tubo-ovarian abscess (hysterectomy)	1
Tubo-ovarian cyst and papillary cyst	1
Ovaropexy	2
Pyosalpinx (unilateral)	3
" (bilateral)	3
Hydrosalpinx	1
Hematosalpinx	1
Diseased appendages	9
Ectopic gestation	15
Exploratory incision for pelvic peritonitis	1
Vaginal section for:	
Dermoid cyst	1
Exploratory incision for dermoid in sacral hollow	1
Tubo-ovarian abscess	1
Pyosalpinx	1
Pelvic abscess	9
Hematocele	5
Curettage for parametritis	1

Miscellaneous (68 operations).

Appendicectomy for acute gangrenous appendicitis with abscess	1
" " " " perforative appendicitis with serous peritonitis	1
" " chronic appendicitis	4
Accouchement forcé for hyperemesis	1
Excision of cyst of canal of Nuck	1
Radical cure for ventral hernia	2
Incision and drainage for suppurative axillary lymph-adenitis	1
Exploratory laparotomy for general abdominal carcinomatosis	1
Bassini's operation	1
Incision and drainage of intra-abdominal abscess	1
Enucleation of mammary fibroma	1
Cholecystectomy for cholelithiasis	1
Curettage for streptococcemia	1
Excision of lipoma of abdominal wall	1

Miscellaneous—*(Continued).*

Removal of silk ligature from sinus of abdominal wall	1
Excision of fibroma of abdominal wall	1
Radical cure for femoral hernia	1
Excision of sarcomatous inguinal glands	1
" " carcinomatous axillary glands	1
Nephrotomy for nephrolithiasis	1
Curettage for retained secundines	1
Appendicectomy for normal appendices removed during laparotomies performed for other diseases	43

GYNECOLOGICAL SERVICE.

From December 1, 1905, to December 1, 1906.

JOSEPH BRETTAUER, M.D.,
GYNECOLOGIST.
S. M. BRICKNER, M.D.,
ADJUNCT GYNECOLOGIST.

Patients admittted	527
Diseases treated	698
Cured	584
Improved	41
Unimproved	56
Died	17
Number of operations	615

DISEASES.

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Vulva (2 cases).						
Abscess of vulva	..	1	..	..	..	1
Hypertrophy of labia minora	..	1	..	..	..	1
Urethra and Bladder (5 cases).						
Urethral caruncle	..	2	..	..	..	2
Papilloma of bladder	..	..	1	..	..	1
Cystitis	1	1	..	..	..	1
Incontinence of urine	1	..	1	..	..	1
Vagina (101 cases).						
Cystocele	3	37	..	3*	1	41
Rectocele	2	52	..	2*	..	54
Vaginal septum	1	1	..	1	..	2
Gangrene of vagina (post-partum) with purulent peritonitis	..	1	..	..	..	1
Vaginal cyst	..	1	..	..	..	1
Carcinoma of vagina (primary)	..	1	..	..	..	1
" " " scondary to malignant ovarian cyst.	..	..	1	..	..	1
Perineum (5 cases).						
Complete laceration	..	4	..	..	..	4
Incomplete "	..	1	..	..	..	1

*Refused operation.

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Rectum (4 cases).						
Hemorrhoids	..	2	..	..	..	2
Prolapse of rectum	..	2	..	..	..	2
Uterus (398 cases).						
Cervix (66 cases).						
Injuries: Lacerated cervix	4	24	1	3	..	28
Inflammations: 1. Hypertrophied cervix	1	2	..	1	..	3
2. Endocervicitis	..	21	..	..	..	21
3. Ulceration of cervix	..	1	..	..	..	1
4. Gangrenous cervicitis; gangrene of pre-vesical space; pelvic peritonitis	1	..	..	..	1	1
New Growths: 1. Benign: Polyp	..	5	..	..	..	5
Cervical fibroid	..	1	..	..	..	1
2. Malignant: Carcinoma	1	3	2	1	..	6
Body (332 cases).						
(a) *Abortions:* 1. Incomplete	..	42	1	..	..	43
2. Inevitable	2	2	..	..	..	2
3. Threatened	3	4	..	1	..	5
(b) *Inflammations:* 1. Post-abortive endometritis	..	9	..	..	..	9
2. Chronic endometritis	5	90	2	2	1	95
3. Post-partum sepsis	..	..	..	..	4	4
4. Chronic metritis	..	2	..	..	..	2
5. Subinvoluted uterus	1	1	..	..	..	2
6. Parametritis	4	1	2	1	..	4
7. Perimetritis	2	..	2	..	..	2
8. Tuberculosis of uterus	..	1	..	..	..	1
9. Perforation of uterus	1	2	..	..	..	2
(c) *New Growths:* I. Benign: 1. Fibroid uterus	4	39	6	5	2*	52
2. Subserous fibroid	..	2	..	..	..	2
3. Submucous fibroid	1	5	..	1	..	6
4. Sloughing fibroid	..	1	..	..	..	1
5. Fibroid, pregnancy	2	2	..	2	..	4
6. Hydatidiform mole	..	1	..	..	..	1
II. Malignant: 1. Carcinoma	..	3	..	..	..	3
(d) *Displacements:* 1. Anteflexion and stenosis	2	28	1	2	..	31
2. Retroversion and retroflexion	6	37	..	6	..	43
3. Prolapsus uteri	2	7	1	1	..	9
4. Incarcerated uterus (pregnant)	1	1	..	..	..	1
(e) *Malformations:* 1. Uterus duplex	..	..	..	1	..	1
2. Hematometra	..	2	..	..	..	2
(f) *Pregnancy:* 1. Normal labor	..	1	..	..	..	1

* One case complicated with strangulated umbilical hernia.

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Body—*(Continued).*						
2. Contracted pelvis	1	..	..	1	..	1
3. Nephritis	..	1	..	..	..	1
4. Endocarditis	..	..	..	..	1	1
5. Pyelitis	..	1	..	..	..	1
Ovaries (38 cases).						
Cyst: 1. Simple	..	14	..	..	..	14
2. Dermoid	..	6	..	..	..	6
3. Bilateral dermoid	..	3	..	..	..	3
4. Tubo-ovarian	..	2	..	..	..	2
Inflammations: 1. Abscess	..	1	..	..	..	1
2. Tubo-ovarian abscess	..	3	..	..	..	3
New Growths: Benign: Fibroma	..	1	..	..	..	1
Malignant: 1. Carcinoma	..	..	1	1	1	3
2. Dermoid cyst with carcinoma	..	1	..	..	..	1
3. Papillary ovarian cyst	..	2	..	1	..	3
4. Sarcoma	..	1	..	..	..	1
Tubes (56 cases).						
1. Pyosalpinx, unilateral	1	5	1	..	..	6
2. Pyosalpinx, bilateral	1	5	..	1	1	7
3. Hydrosalpinx	..	1	..	..	..	1
4. Diseased appendages	7	14	5	2	..	21
5. Acute salpingitis	2	1	2	..	..	3
6. Hematosalpinx	1	..	..	1	..	1
7. Tubal cyst	..	1	..	..	..	1
8. Ectopic pregnancy	1	13	..	1	2	16
Pelvic Peritoneum and Cellular Tissue (42 cases).						
Pelvic abscess	1	15	1	1	..	17
Exudate	19	12	6	1	1	20
Hematocele	..	3	..	..	..	3
Pelvic peritonitis	2	1	1	..	..	2
Miscellaneous (47 cases).						
Chronic appendicitis	2	8	..	1	..	9
Empyema of appendix	..	2	..	..	..	2
Acute catarrhal appendicitis with abscess	..	1	..	..	..	1
Acute gangrenous appendicitis	..	5	..	..	..	5
Primary syphilis	1	..	2	..	..	2
Neurasthenia	3	..	..	3	..	3
Nephroptosis	..	2	..	..	..	2
Phantom tumor	..	1	..	..	..	1
Senile dementia	1	..	..	1	..	1
Eclampsia	1	2	..	..	..	2

Miscellaneous—*(Continued).*	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Intestinal fistula	..	2	..	1	..	3
Femoral hernia	..	1	..	..	..	1
Ventral "	..	2	..	..	..	2
Tubercular peritonitis	..	..	..	1	..	1
Phlebitis	1	1	..	..	..	1
Meningitis	1	..	..	1	..	1
Typhoid fever	1	..	..	1	..	1
Retroperitoneal sarcoma	1	..	..	..	1	1
Abdominal tumor of unknown origin	1	..	..	1	1	2
Carcinoma of breast	..	2	..	..	..	2
Diabetes	2	..	1	1	..	2
Nihil	2	..	..	?	..	2

Operations.

Vulva (2 operations).

Incision of abscess of vulva 1
Excision of hypertrophied labia minora 1

Urethra and Bladder (3 operations).

Suprapubic cystotomy for papilloma of bladder 1
Cauterization of urethral caruncle 2

Vagina (102 operations).

Anterior colporrhaphy 40
Posterior " 56
Vaginal fixation of uterus for cystocele 1
Excision of vaginal cyst 1
" " primary carcinoma of vagina 1
Curetting of carcinoma of vagina secondary to malignant ovary 1
Incision and drainage of peritoneum for gangrene of vagina and peritonitis 1
Excision of vaginal septum 1

Perineum (5 operations).

Tait for complete laceration 4
" " incomplete " 1

Rectum (5 operations).

Clamp and cautery for hemorrhoids 2
Plastic for prolapse of rectum 2
Sigmoidopexy for prolapse 1

Uterus (364 operations).
Cervix (56 operations).

Trachelorrhaphy for laceration 40
Amputation for hypertrophy 8
Amputation for cervical fibroid 1
Excision of cervical polyp 5
Paquelinization for carcinoma 2

Body (308 operations).

Curettage for incomplete abortion, inevitable abortion, post-abortive endometritis, chronic endometritis and metritis, fibroid uterus, endocervicitis, hydatidiform mole 179
Induction of abortion 4
Accouchement forcé 2
Incision and drainage for hematometra 2
Abdominal section for perforation of uterus 1
Abdominal hysterectomy:
1. Fibroid uterus 37
2. Metritis 1
3. Tuberculosis of uterus 1
4. Carcinoma of cervix (Wertheim) 3
Vaginal hysterectomy:
1. Fibroid uterus (without tubes and ovaries) 2
2. Fibroid uterus (tubes and ovaries out) 9
Abdominal myomectomy 4
Intra-abdominal shortening of round ligaments 2
Alexander's operation for retroflexion and retroversion 15
Ventral fixation 32
Dudley's operation for anteflexion and stenosis 12
Vaginal myomectomy 1
Exploratory laparotomy for fibroids 1

Ovaries and Tubes, Pelvic Peritoneum and Cellular Tissue (105 operations).

Abdominal section for:
Simple ovarian cyst 15
Dermoid cyst 7
Tubo-ovarian cyst 2
Sarcoma ovary 1
Fibroma " 1
Carcinoma of ovary 1
" " " (hysterectomy) 2
Ectopic pregnancy 12
Hydrosalpinx 2
Pyosalpinx (double) 8
" (unilateral) 3
Hematocele 2
Diseased appendages 9
" " (hysterectomy) 7
Papillary ovarian cyst 3
Ovarian abscess (hysterectomy) 1
Salpingitis 1
Tubal cyst 1
Vaginal section for:
Dermoid cyst 1
Ectopic pregnancy 2

Ovaries and Tubes, Pelvic Peritoneum and Cellular Tissue—*(Continued).*

Ovarian cyst	1
Tubo-ovarian abscess	1
Tubo-ovarian abscess (double) hysterectomy	1
Pelvic abscess	16
Hematocele	2

Miscellaneous (29 operations).

Appendicectomy for chronic appendicitis	8
" " empyema of appendix	2
" and drainage for gangrenous appendicitis with abscess	1
" " " " " " " peritonitis	2
Incision and drainage of appendix abscess	1
Appendicectomy and drainage for acute catarrhal appendicitis with abscess	1
Nephropexy	2
Exploratory laparotomy for phantom tumor	1
Laparotomy, suture and closure for intestinal fistula	2
Curetting of intestinal fistula	1
Laparotomy for tuberculous peritonitis	1
" " retro-peritoneal sarcoma	2
Radical cure for femoral hernia	1
" " " ventral "	2
Amputation of breast for carcinoma	2

SPECIAL CASES.

By Dr. J. Brettauer.

Intestinal obstruction due to adhesions between sigmoid and left pyosalpinx; bilateral pyosalpinx; abdominal panhysterectomy; appendectomy; recovery.—Surgical No. 81131 *(a)*; A. G., aged 34 years, Austria. Admitted Jan. 16th, 1905. Operated upon Jan. 17. Discharged Feb. 4th. Previous history negative, except for chronic constipation; has been married 13 years, aborted once shortly after marriage, no children. Menstrual history shows no abnormalities. Five years ago had sharp attack of pain in left lower part of abdomen which lasted 24 hours; this has never recurred.

For the past three months the menstruation has been more profuse and has been somewhat irregular; last menstruation, normal in quantity and appearance, two weeks ago.

Present History.—Eight days ago patient was seized with sudden, severe cramps in the lower part of the abdomen, accompanied by fever and chilly sensations. For the first four days the bowels moved with the aid of enemata; for the past four days no movement has been obtained despite active catharsis. Vomiting started 24 hours ago and has been continued up to the time of admission. Pain, vomiting and distension have increased since onset.

On admission, the patient looked very ill, had an anxious facies, furred tongue, temperature of 101.6 F., and a pulse of 108 of good quality. The abdomen was tremendously distended, tympanitic, generally rigid. On vaginal examination, a hard tender mass the size of a grape fruit could be felt in the posterior fornix, the fundus being felt anteriorly; another mass, slightly movable and not so tender, could be felt in the left fornix. There was a slight bloody vaginal discharge.

Operation.—When the abdomen was opened, the sigmoid flexure was found adherent to the upper part of the left tube by dense adhesions which gave the adherent portion of the sigmoid the shape of a very sharp acute angle, completely obstructing its lumen. Both tubes were found to be the seat of pus and, together with the uterus, were removed, the right tube bursting during its enucleation from a deep bed of adhesions. Vaginal drainage was instituted and the patient was returned to bed suffering very little from shock.

There was practically no reaction from the operation and conva-

lescence was uninterrupted. The bowels were moved easily by low enema the day after operation and daily thereafter. The wound healed primarily. The patient has been under frequent observation since the operation and aside from occasional constipation is entirely well.

Repeated extra-uterine pregnancy; ruptured tubal pregnancy; left salpingo-oöphorectomy; recovery.—Surgical No. 81,721; C. S., aged 30 years, Russia. Admitted Feb. 28th; operated upon Feb. 28th; discharged March 8th, 1905.

Three years before the patient had been operated upon in the hospital for a ruptured right tubal pregnancy. At that time she had given a fairly typical history of extra-uterine pregnancy which was of nine weeks duration. She made a good recovery and up to the time of her second admission has been in good health.

Present History.—Last menses seven weeks ago, normal in time and amount. Four weeks ago began to have darting pains in the breasts. The patient should have menstruated three weeks ago, but did not and therefore considered herself pregnant. Morning nausea was present from the onset. Abdominal pain, not localized, began three weeks ago, and was of a cramp-like character. There has been increased frequency of urination. The abdominal cramps and the urinary symptoms have continued up to the time of admission.

Twelve hours before admission, there was a very sharp, unlocalized attack of abdominal cramps, and the patient became weak and dizzy, but did not faint. With the onset of this attack there was some spotting for the first time. No clots have appeared. The patient feels very weak. From the presence of a soft pelvic mass in the left fornix, tender to pressure, and from the history, the diagnosis of a ruptured tubal pregnancy was made, and the patient was operated upon immediately upon admission.

Operation.—The pelvis was filled with blood, both fresh and old, and some fresh blood was found among the intestinal coils. The left tube and ovary were quickly brought into the wound and removed. The specimen showed a rupture of the left tube near its outer third, about the size of a twenty-five cent piece. The tube was empty in this portion, but at the uterine end was found a dilatation which contained blood clot adherent to decidual tissue. A fetus of six weeks was attached to a blood clot hanging from the fimbriated end of the tube.

The convalescence was uninterrupted and the wound healed primarily.

Repeated extra-uterine pregnancy; pelvic hematocele; posterior vaginal section; recovery.—M. W., aged 25 years, Austria; admitted Feb. 25th; operated upon Feb. 28th; discharged March 14, 1905.

Surgical No. 81678 *(a)*. Five years previously the patient had been operated upon at another hospital for a ruptured left tubal pregnancy. She had had a normal pregnancy which went to term one year previously. She remained in good health after the operation until seven weeks before admission when she last menstruated; since this time she has had pain in the right side of the pelvis. Four weeks ago she had a rather profuse hemorrhage of dark blood, with cramp-like pains on the right side. An irregular but fairly constant flow continued up to the time of admission and the sharp, stabbing pains in the abdomen became persistent. There has been an increased frequency of urination for the past fifteen days.

On admission, the somewhat anemic patient had a scanty, bloody vaginal discharge. The uterus was softened and somewhat enlarged. The right lateral fornix was filled with an irregular mass the size of a grape fruit, the tumor extending above the pubes and into the posterior fornix. Pulsation was present over the mass.

Operation.—A posterior vaginal section was made and a large quantity of dark old blood and clots was removed. The cavity was drained. Recovery was uneventful.

Post-partum suppurative vaginitis; purulent peritonitis; incision and drainage of peritoneal cavity; recovery.—S. H., 30 years, Austria, Surgical No. 82039; admitted Nov. 27th; operated upon March 3d; discharged March 30th, 1906. The patient had had three children, the last one, one week before admission, after repeated instrumentation by her physician. The character of the instrumentation it was impossible to find out. She gave a history of chills, fever and involuntary stools. When she was admitted her temperature fluctuated between 96.6 F., and 103 F., pulse 124. The abdomen was extremely distended, especially tense in the hypogastric regions. There was a complete tear of the perineum, the cervix was bilaterally lacerated and necrotic, the uterus was five fingers above the umbilicus.

The condition did not improve after several days and on March 3d, after a preliminary aspiration which yielded pus, a two inch incision was made in the left inguinal region parallel to Poupart's ligament and a large quantity of pus was evacuated. The cavity, which was later found to be the general peritoneal cavity, was drained. Aside from an intercurrent hemorrhage from the necrotic cervix, which was easily controlled by packing, the recovery from now on was speedy. The wound discharged freely for some weeks, control of the bowels was soon re-established, the vomiting ceased, and the vaginal discharge, which had been very foul and very profuse, gradually disappeared.

The cultures from the pus obtained from the peritoneal cavity showed the presence of streptococci and the colon bacillus.

SYNOPSIS OF DEATHS.

DECEMBER 1ST, 1904, TO DECEMBER 1ST, 1906.

CASE I.—*Fibroid uterus: cholelithiasis: empyema of gall bladder.* —G. M., age 50, admitted Nov. 15th, died Dec. 9th, 1904; operated upon Nov. 24th for uterine fibroids. She made a good recovery from the abdominal hysterectomy, but the urgent condition of the empyema of the gall bladder made a cholecystectomy necessary on the twentieth day after the operation. There was considerable hemorrhage during the operation and the patient died three hours later of shock.

CASE II.—*Infected hematocele; general peritonitis.*—E. K., admitted Dec. 7th, died Dec. 11th, 1904. The patient was admitted with a typical history of hematocele; she had a temperature of 104 and a pulse of 120. The abdomen was tympanitic and tender. She was not operated upon and gradually grew weaker and died.*

CASE III.—*Cystitis; asthenia and starvation.*—S. M., 36 years of age, admitted Jan. 15th, died Jan. 25th, 1905. On admission the patient was passing blood, mucus and small calculi in the urine. She was exceedingly emaciated. No tubercle bacilli were found in the urine. The composition of the urine gradually grew worse and the patient died, a typical picture of asthenia.*

CASE IV.—*Carcinomatosis of the general abdominal cavity.*—A. C., 34 years of age, admitted Feb. 6th, died Feb. 21st, 1905. The patient was transferred from the medical service with the diagnosis of tubercular peritonitis. An exploratory laparotomy revealed all the organs of the abdominal cavity densely studded with small metastatic deposits of epithelial carcinoma, originating in the sigmoid. The patient gradually failed after operation, and died after metastases appeared in the right parotid gland and on the right cheek. No autopsy.

CASE V.—*Post-partum sepsis; streptococcemia.*—A. T., 38 years of age, admitted Feb. 25th, died Feb. 27th, 1905. One week previous to admission the patient was normally delivered by a midwife; five days later she had fever and chills. She was moribund on admission and died with symptoms of general sepsis. The autopsy showed acute parenchymatous degeneration of the abdominal and thoracic organs, gangrene of the uterine mucosa and suppurative phlebitis of the veins of the broad ligaments. Streptococci were isolated from the blood during life.*

*Not operated upon.

CASE VI.—*Fibro-myosarcoma of uterus and retroperitoneal tissues.* —F. C., age 66, admitted March 27th, died April 7th, 1905. For the past six months the patient has been gradually losing flesh and strength and her abdomen has become larger in size; she has been in bed for the last two months. The tumor occupied the entire abdomen, from the pelvis to two fingers above the umbilicus. Supravaginal hysterectomy was performed on March 28th, and although the wound healed primarily, the patient died ten days later. The autopsy disclosed a fungoid necrotic mass, occupying the retro-peritoneal space.

CASE VII.—*Intestinal obstruction of unknown origin.*—M. D., age 30, admitted March 31st, died April 1, 1905. The patient was admitted in a moribund condition, with a history of intestinal obstruction of one week's duration; she was in the sixth week of a puerperium. Died three hours after admission. No autopsy.*

CASE VIII.—*Sepsis following curettage for abortion; streptococcemia; septic endocarditis.*—E. F., age 40, admitted July 8th, died July 19th, 1905. The patient was curetted 17 days before admission for an incomplete abortion; chills and fever developed immediately after the operation; on admission a foul discharge was present. The uterus was soft and enlarged and a loud systolic murmur was heard at the apex. The blood culture showed streptococci. The highest leucocytosis was 7,300. Autopsy showed a verrucous endocarditis of the mitral flap.*

CASE IX.—*Streptococcemia following abortion; septic endocarditis.*—K. O., age 23, admitted Aug. 30th, died Sept. 5th, 1905. Abortion two weeks ago; curetted twice. On admission the patient presented the general and special symptoms of violent sepsis. Streptococci were isolated from the blood; petechiæ developed and the patient rapidly grew worse and died. At the autopsy petechiæ were found in the pericardium and vegetations on the mitral and aortic valves. A septic thrombus was found at the bifurcation of the left common iliac vein and also in the left uterine vein.

CASE X.—*Peritoneal sepsis following hysterectomy and double salpingo-oöphorectomy.*—R. G., age 44, admitted Nov. 1st, died Nov. 9th, 1905. On admission the patient was found to have a fibroid tumor of the uterus and a cyst of the left ovary. The cyst was covered with adherent omentum and was deeply adherent to the cul-de-sac. The patient developed a peritonitis and died four days after operation. No autopsy.

CASE XI.—*Shock and peritonitis following panhysterectomy for double ovarian abscess.*—L. B., age 40, admitted Nov. 13th, died

*Not operated upon.

Nov. 18th, 1905. The patient was operated upon for double pyosalpinx and ovarian abscess; during their removal some pus was spilled from the bursting of the abscesses. The patient developed septic peritonitis and died three days after operation. No autopsy.

CASE XII.—*Sepsis following induction of labor.*—B. V., age 32 years, admitted Feb. 11th, died Feb. 21st, 1906. The patient was admitted bleeding profusely from a seven month's pregnant uterus. As the cervix was open labor was induced under strict precautions by packing the cervix with iodoform gauze. On the following day delivery took place and ten hours later some small pieces of retained placenta were removed manually. Sepsis developed, as indicated by the pulse and temperature within a few hours after the termination of the labor. Six days later the patient died, the intrauterine and blood cultures showing streptococci.

CASE XIII.—*Gangrenous cervicitis; gangrene of the pelvic and subcutaneous tissues; pelvic peritonitis; septicemia.*—S. C., age 42, admitted Feb. 19th, died Feb. 24th, 1906. The patient had had eleven premature labors on account of a contracted pelvis. Four days before admission she had been instrumentally delivered of a living child. On admission she had a high temperature, a tremendously distended abdomen, and profuse, brownish, putrid lochia. She developed a hypostatic pneumonia which hastened her death. The autopsy disclosed a gangrene of the cervix, of the greater part of the uterus, of the pelvic connective and subcutaneous tissues on the left side and a huge fresh exudate about the uterus.*

CASE XIV.—*Retroperitoneal sarcoma.*—M. G., age 53, admitted May 15th, died May 22d, 1906. The abdomen was markedly and irregularly enlarged and was occupied by an irregularly shaped, hard, slightly movable mass extending up to the ensiform cartilage. Laparotomy proved the mass to be retroperitoneal with the intestines and the left ureter adherent to it. The tumor apparently originated in the sheath of the large vessels and in its removal one of them was cut, producing a furious hemorrhage. The vessel was caught and tied between two clamps. The patient died 11½ hours later from shock and hemorrhage.

CASE XV.—*Adenocarcinoma of both ovaries; fibroid uterus; cerebral embolism.*—F. B., age 42, admitted May 24th, died May 26th, 1906. The patient's abdomen was occupied by a large, hard, irregular, slightly tender tumor which apparently moved with the cervix, behind which lay a smaller hard mass. Laparotomy disclosed fibroids of the uterus and a malignant growth of both ovaries. The patient died suddenly the following day of cerebral embolism. No autopsy.

*Not operated upon.

CASE XVI.—*Ruptured extra-uterine pregnancy.*—J. C., age 35, admitted May 31st, died June 1st, 1906. The patient was admitted with a typical history of ruptured tubal pregnancy. Under anesthesia, the pelvic findings seemed to be those of an ordinary abortion and a curettage was done. Two hours later the patient went into profound collapse, and a rapid laparotomy was performed; the abdomen was found filled with blood from a ruptured tubal pregnancy. The patient did not rally, however, and died two hours later.

CASE XVII.—*Relaxed vaginal outlet; secondary suture for hemorrhage; cerebral embolism (?).*—R. G., age 44, admitted July 31st, died August 5th, 1906. The patient was admitted with a relaxed vaginal outlet, for which an anterior and posterior colporrhaphy were performed. There was considerable bleeding from the cystocele operation, necessitating the opening of the wound and a subsequent secondary suture. Two days later the temperature and pulse rose and the patient sank into unconsciousness, in which condition she died two days later. The urine was negative throughout and although no autopsy could be obtained, the symptoms were those of cerebral involvement.

CASE XVIII.—*Abdominal tumor of unknown origin.*—R. F., age 33, admitted Sept. 6th, died Sept. 15th, 1906. Admitted with a large, rounded, irregularly shaped mass, occupying the lower part of the abdomen. Exploratory laparotomy revealed a large mass adherent to the parietal peritoneum, containing yellowish, colloid material. The uterus and appendages were normal. Four days after operation the patient became comatose and died. No autopsy.

CASE XIX.—*Puerperal sepsis.*—L. N., age 27, admitted Sept. 3d, died Sept 16th, 1906; was instrumentally delivered three months before admission. From the time of her confinement the patient has been ill with fever and chills and was in a miserable condition on admission. She steadily grew worse and died thirteen days after her entrance. At the autopsy a septic thrombosis of the left uterine and ovarian veins was found.*

CASE XX.—*Pelvic exudate.*—S. H., age 40, admitted Oct. 13th, died Oct. 18th, 1906, with a history of pelvic inflammation. The existence of a pelvic abscess was suspected and an incision was made over the infiltrated tissues in the right iliac region, but no pus was obtained. The patient did not rally and died the next morning. No autopsy.*

CASE XXI.—*Puerperal sepsis.*—B. S., age 30, admitted Nov. 5th,

*Not operated upon.

died Nov. 10th, 1906; was normally delivered three weeks before admission. She was extremely septic. The abdomen was distended and contained a tender mass which was slightly movable. The blood culture showed staphylococcus aureus. The patient's weakness increased and she died unconscious. No autopsy.*

Case XXII.—*Ruptured tubal pregnancy.*—M. B., age unknown, admitted Nov. 26th, 1906, pulseless and with intense pallor, with a history given by friends of a tubal pregnancy. She was immediately operated upon, the ruptured left tube being rapidly removed. The abdomen was literally distended with blood. Despite intravenous and subcutaneous infusions and vigorous stimulation, the patient died a few hours after the operation.

Case XXIII.—*Bilateral pyosalpinx; pelvic exudate; lobar pneumonia.*—P. Z., age 36, admitted Nov. 18th, died Nov. 30th, 1906. The patient's history was typical of a subacute inflammatory pelvic process. At the operation it was found that the patient had a double pyosalpinx, with dense adhesions. A supravaginal hysterectomy and bilateral salpingo-oophorectomy were performed. The patient did very well for five days, when she developed a lobar pneumonia of which she died.

*Not operated upon.

GYNECOLOGICAL SERVICE.

From December 1, 1904, to December 1, 1905.

FLORIAN KRUG, M. D.,
GYNECOLOGIST.

HIRAM N. VINEBERG, M.D.,
ADJUNCT GYNECOLOGIST.

Patients admitted		413
Diseases treated		693
Cured	634	
Improved	28	
Unimproved	31	
1. Treated	3	
2. Not treated	28	
Died	20	
Number of operations		609

DISEASES.

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Vulva.						
Carcinoma of vulva	..	...	1	..	..	1
Bartholinian abscess	..	2	..	..	..	2
Infected vulvovaginal cyst	..	2	..	..	..	2
Condylomata of vulva	..	1	..	..	..	1
Urethra and Bladder.						
Complete laceration of the urethra	1	...	..	1	..	1
Gangrenous cystitis	1	...	..	..	1	1
Urethral caruncle	..	2	..	..	..	2
Vagina.						
Cystocele	1	30	..	1	..	31
Rectocele	1	36	..	1	..	37
Carcinoma of vagina	..	...	2	..	..	2
Atresia vaginæ	..	3	..	..	..	3
Persistent vaginal sinus after hysterectomy	..	1	..	..	..	1
Vaginal septum	..	1	..	..	..	1
Perineum.						
Complete laceration of perineum	1	1	..	1	..	2

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Rectum.						
Fistula in ano	..	2	..	..	..	2
Carcinoma of rectum	1	...	..	1	..	1
Sarcoma of rectum	..	1	..	..	..	1
Rectal polyps	..	1	..	..	..	1
Hemorrhoids	..	1	..	..	..	1
Cervix.						
Lacerated cervix	..	10	..	..	..	10
Hypertrophy of cervix	..	32	..	..	..	32
Endocervicitis	..	5	..	..	..	5
Cervical polyp	..	2	..	..	..	2
Carcinoma of cervix	..	1	4	..	2	7
Pregnancy.						
Normal pregnancy	6	...	..	6	..	6
Pregnancy complicated by pyelitis	..	...	1	..	..	1
" " " septicemia	..	...	..	..	1	1
" at term, contracted pelvis	..	1	..	..	..	1
Retroflexion of gravid uterus	..	1	..	..	..	1
Retroverted incarcerated gravid uterus	..	1	..	..	..	1
Pregnancy complicated by stenosis of cervix (post-partum hemorrhage)	..	...	..	..	1	1
Pelvic Pertoneum.						
Abscess	1	14	1	..	1	16
Exudate	10	1	9	..	..	10
Multiple pelvic abscesses	..	...	..	..	1	1
Multiple abscesses of the broad ligament	..	1	..	..	..	1
Abortions.						
Incomplete	..	33	..	..	..	33
Inevitable	..	2	..	..	..	2
Induced (1. Placenta praevia. 2. Pulmonary tuberculosis. 3. Insanity)	..	1	2	..	..	3
Inflammations of Uterus.						
Post-abortive endometritis	2	22	..	1	..	23
" sepsis, post-partum sepsis	2	...	..	..	4	4
Puerperal endometritis	..	2	..	..	..	2
Subinvolution	1	1	..	..	..	1
Chronic endometritis	2	178	..	2	..	180

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Benign New Growths of Uterus.						
Polyp	..	1	..	..	..	1
Fibroids of uterus	..	34	..	..	1	35
Sloughing fibroids	..	1	..	..	..	1
Malignant New Growths of Uterus.						
Carcinoma	1	1	..	..	2	3
Displacements of Uterus.						
Anteflexion and stenosis	..	2	..	..	..	2
Retroflexion and retroversion	..	27	..	..	..	27
Partial and complete prolapse	..	6	..	..	..	6
Miscellaneous Affections of the Uterus.						
Hematometra in a bicornate uterus	..	1	..	..	..	1
Bicornate uterus—hematosalpinx	..	1	..	..	..	1
Hydatid mole complicated by eclampsia	..	1	..	..	..	1
Metrorrhagia	..	1	..	..	..	1
Ovary.						
Simple cyst	..	15	..	..	..	15
Tubo-ovarian cyst	..	1	..	..	..	1
Dermoid cyst	..	1	..	..	..	1
Intraligamentous cyst	..	4	..	..	..	4
Parovarian cyst	..	3	..	..	..	3
Double ovarian cysts	..	5	..	..	..	5
" intraligamentous cysts	..	2	..	..	..	2
" parovarian cysts	..	1	..	..	..	1
" dermoid cysts	..	4	..	..	..	4
Ovarian abscess	..	5	..	..	..	5
Double ovarian abscess	..	1	..	..	..	1
Carcinoma of the ovaries—abdominal metastases	..	...	..	..	1	1
Tubes.						
Ectopic gestation	1	22	..	1	1	24
Pyosalpinx	..	8	..	..	..	8
Diseased adnexa	2	36	..	2	3	41
Hydrosalpinx	..	3	..	..	..	3
Infected ectopic gestation	..	2	..	..	..	2
Miscellaneous.						
Thrombophlebitis of femoral vein	2	2	..	..	..	2
Chronic appendicitis	..	6	..	..	..	6

Miscellaneous—*(Continued).*	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Acute Appendicitis	..	6	..	..	..	6
Persistent sinus of abdominal wall	1	...	..	1	..	1
Syphilis	1	...	1	..	..	1
Perithelial sarcoma of kidney, ascending colon, and ovaries	..	...	..	..	1	1
General abdominal carcinomatosis	..	...	1	2	..	3
Retroperitoneal tumor	..	...	..	1	..	1
Carcinoma of stomach	1	...	1	1	..	2
Inguinal abscess	..	1	..	..	..	1
Tuberculous peritonitis	..	...	2	..	..	2
Chronic cholecystitis	1	...	..	1	..	1
Empyema of gall-bladder	..	1	..	..	..	1
Coccygodynia	..	1	..	..	..	1
Secondary anemia	1	...	..	1	..	1
Hysteria major	1	...	1	..	..	1
Typhoid fever	2	...	..	2	..	2
Neurasthenia	1	...	1	1	..	2
Delirium tremens	1	...	..	1	..	1
Ventral hernia	..	2	..	..	..	2
Diastasis recti	1	...	..	1	..	1
Pseudohermaphroditism	1	...	..	1	..	1
Gonorrheal arthritis	1	...	..	..	..	1
Mitral stenosis	1	...	..	1	..	1
Nephritis	1	...	1	..	..	1
Malaria	1	1	..	..	..	1
Enteroptosis	1	...	1	..	..	1
Intra-abdominal abscess	..	1	..	..	..	1

Operations.

Vulva.

Incision and drainage of Bartholinian abscess	1
Excision " " " " "	1
" " " " infected vulvovaginal cyst	2
" of carcinoma of vulva	1
" " vulval condylomata	1

Vagina.

Anterior colporrhaphy	30
Posterior "	36
Vaginal fixation of uterus	3
Curetting and cauterization of carcinoma of vagina	2
" of persistent vaginal sinus after hysterectomy	1
Plastic on atresia vaginæ	3
" " vaginal septum	1

Perineum.

Tait flap-splitting perineorraphy for complete tear	1

Rectum.

Excision and suture of fistula in ano	2
" of sarcoma of rectum	1
" " rectal polyps	1
Clamp and cautery for hemorrhoids	1

Urethra.

Excision of urethral caruncle	2

Cervix.

Trachelorrhaphy for laceration	10
Amputation for hypertrophy	32
Cauterization for endocervicitis	5
Avulsion of cervical polyp	2
Curettage and paquelinization for carcinoma of cervix	3
Hysterectomy for carcinoma of cervix	1

Pregnancy.

Induction of labor for pregnancy complicated by pyelitis	1
Accouchement forcé for pregnancy complicated by septicemia	1
Low forceps for pregnancy complicated by contracted pelvis	1
Replacement of gravid uterus in retroflexion	1
" " retroverted incarcerated gravid uterus	1
Accouchement forcé and dilatation of cervix for stenosis complicating pregnancy	1

Pelvic Peritoneum.

Posterior vaginal section for pelvic abscess	15
Hysterectomy and drainage for pelvic abscesses	1
" " " " multiple abscesses of broad ligament	1

On Body of Uterus.

Curettage for incomplete abortion, inevitable abortion, post-abortive endometritis, post-abortive sepsis, puerperal endometritis, chronic endometritis	224
Induction of abortion for placenta praevia	1
" " " " pulmonary tuberculosis	1
Abdominal hysterectomy for fibroid uterus	29
Vaginal hysterectomy for fibroid uterus	3
" " " sloughing fibroids	1
" myomectomy	1
Excision of uterine polyp	1
Abdominal hysterectomy for carcinoma of uterus	1
Exploratory laparotomy for inoperable carcinoma of uterus	1
Dudley's operation for anteflexion and stenosis	2
Ventral fixation for retroversion	21
" " " retroflexion	5
Hysterectomy for retroflexion (recurrent)	1
Vaginal fixation for partial prolapse	4

On Body of Uterus—*(Continued).*

Ventral fixation for complete prolapse	2
Hysterectomy for hematometra	1
Amputation of horn of bicornate uterus	1
Vaginal Caesarian section for hydatid mole	1
" hysterectomy for metrorrhagia	1
" " " complete prolapse	1

Abdominal Section for

Simple cyst	15
Tubo-ovarian cyst	1
Dermoid cyst	1
Intraligamentous cyst	4
Parovarian cyst	3
Double ovarian cysts	5
" intraligamentous cysts	2
" parovarian cyets	1
" dermoid cysts	4
Ovarian abscess	5
Double ovarian abscess	1
Carcinoma of the ovaries	1
Ectopic gestation	22
Pyosalpinx	8
Diseased adnexa	29
Infected ectopic	2
Hydrosalpinx	3
Hysterectomy for diseased adnexa	10
Vaginal salpingectomy for pyosalpinx	1
Posterior vaginal section for pyosalpinx	2

Miscellaneous

Appendicectomy for acute and chronic appendicitis	12
Nephrectomy, resection of colon, bilateral salpingo-oöphorectomy for perithelial sarcoma of kidney, ascending colon, and ovaries	1
Laparotomy for general abdominal carcinomatosis	2
Hysterectomy for carcinoma of uterus, with general abdominal carcinomatosis	1
Posterior gastroenterostomy for inoperable carcinoma of stomach	1
Incision and drainage of inguinal abscess	1
Laparotomy for tuberculous peritonitis	2
Cholecystectomy and drainage for empyema of gall-bladder	1
Coccygectomy for coccygodynia	1
Hernioplasty for ventral hernia	2
Incision and drainage of intra-abdominal abscess	1

GYNECOLOGICAL SERVICE.

From December 1, 1905, to December 1, 1906.

FLORIAN KRUG, M.D.,
GYNECOLOGIST.

HIRAM N. VINEBERG, M.D.,
ADJUNCT GYNECOLOGIST.

Patients admitted		500
Diseases treated		564
Cured	517	
Improved	17	
Unimproved	14	
1. Treated	14	
2. Not treated	10	
Died	16	
Number of operations		654

DISEASES.

	Not Operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Vulva.						
Gonorrheal vulvovaginitis	1	1	1	..	..	2
Bartholinian cyst	..	2	..	..	..	2
Pruritus vulvæ	1	1	..	..	..	1
	2	4	1	..	..	5
Urethra and Bladder.						
Urethral papilloma	..	1	..	..	..	1
" caruncle	..	..	1	..	..	1
	..	1	1	..	..	2
Bladder.						
Incrustation on bladder wall	..	1	..	..	..	1
Cystitis	2	..	2	..	..	2
Stone in bladder	1	..	..	1	..	1
	3	1	2	1	..	4
Kidney.						
Pyelitis in pregnancy	2	1	1	..	..	2
Pyelitis	..	..	1	..	..	1
	2	1	2	..	..	3

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Vagina.						
Hematocolpos, hematometra	..	1	..	..	..	1
Vaginal fistula after hysterectomy	..	1	..	..	..	1
Recurrent carcinoma of vagina and paravaginal tissues	1	..	..	1	..	1
Vesico-vaginal fistula	..	1	..	..	..	1
Vaginismus	..	1	..	..	..	1
Atresia vaginæ with diseased adnexa	..	..	..	..	1	1
" " pyometra, diseased adnexa	..	..	..	..	1	1
Atresia vaginæ, pyometra, diseased adnexa	..	..	..	..	1	1
Carcinoma of vagina and uterus	..	..	3	..	..	3
Gonorrheal vaginitis	1	1	..	..	..	1
Cystocele	..	30	..	..	..	30
Rectocele	..	43	..	..	..	43
	2	79	3	1	2	85
Perineum and Rectum.						
Fistula in ano	..	2	..	..	..	2
Recto-vaginal fistula, rectal incontinence	..	..	..	1	..	1
Carcinoma of rectum	..	1	..	..	..	1
Prolapse of rectum	..	1	..	..	..	1
Hemorrhoids	..	6	..	..	..	6
Lacerated perineum	..	1	..	..	..	1
Complete perineal tear	..	1	..	..	..	1
	..	12	..	1	..	13
Uterus.						
Cervix.						
Injuries: Laceration and hypertrophy	..	1	..	..	..	1
Lacerated cervix	..	21	..	..	..	21
Inflammations: Stenosis of cervix, following trachelorrhaphy	..	1	..	..	..	1
Stenosis of os, endometritis	1	..	..	1	..	1
Hypertrophy of cervix	..	18	..	..	..	18
Secondary syphilis, incomplete abortion	..	1	..	..	..	1
New Growth: Carcinoma	..	1	3	..	..	4
	1	43	3	1	..	47
Body.						
Inflammations: Menorrhagia	..	2	..	..	..	2
Dysmenorrhea	..	1	..	..	..	1
Pyometra	..	2	..	..	..	2
Traumatic perforation, gangrene of intestine	..	..	..	..	1	1
Infection of uterus	..	1	..	..	..	1
Gonorrheal endometritis	..	1	..	..	..	1

Body—*(Continued).*	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Endometritis	..	25	..	..	..	25
Chronic endometritis	..	65	..	..	..	65
	..	97	..	..	1	98
Abortion: Secondary hemorrhage	..	1	..	..	..	1
Incomplete	..	27	..	..	..	27
Post-abortive endometritis	..	21	..	..	..	21
" hemorrhage	..	1	..	..	..	1
Abortion	1	2	..	..	..	3
Post-abortive metrorrhagia	..	3	..	..	..	3
	1	55	..	..	..	56
New Growths: Benign: Uterine polyp	..	2	..	..	..	2
Submucous polyp	..	2	..	..	..	2
Fibroids	1	35	..	1	1	37
Malignant: Cystic degeneration of chorion	..	..	..	..	1	1
Carcinoma	..	3	1	1	..	5
	1	42	1	2	2	47
Displacements: Retroversion of uterus	..	8	..	..	..	8
" hypertrophy of cervix	..	1	..	..	..	1
Retroflexion	1	18	1	..	..	19
Anteflexion	..	9	..	..	..	9
Prolapse	..	15	..	..	..	15
" of uterus, ovarian cyst	..	1	..	..	..	1
	1	52	1	..	..	53
Tubes.						
Bilateral pyosalpinx	..	1	..	..	1	2
Pyosalpinx	..	3	..	..	..	3
Gonorrheal salpingitis and peritonitis	..	1	..	..	..	1
Salpingitis, chronic appendicitis	..	1	..	..	..	1
Gonorrheal salpingitis	..	1	..	1	..	2
Chronic salpingitis	..	1	..	..	..	1
" " and pyosalpinx	..	2	..	..	..	2
Right pyosalpinx, left salpingo-oöphoritis	..	1	..	..	..	1
Chronic salpingo-oöphorectomy	..	1	..	..	..	1
Double salpingo-oöphoritis with intraligamentous fibroids, appendicitis abscess	..	1	..	..	..	1
Bilateral hydrosalpinx	..	1	..	..	..	1
Hydrosalpinx, oöphoritis	..	1	..	..	..	1
Diseased adnexa	..	18	..	..	1	19
Double diseased adnexa	..	10	..	..	..	10
Tubo-ovarian abscess	..	6	..	..	..	6
Double tubo-ovarian abscess	..	1	..	..	..	1
Ectopic gestation	..	14	..	..	1	15

	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Tubes—*(Continued).*						
Suppurating extra-uterine pregnancy, calcareous change with lithopediæ	..	..	..	..	1	1
	..	64	..	1	4	69
Ovaries.						
Cysts: Intraligamentous cysts	..	3	..	..	..	3
Ovarian cyst	..	7	..	..	..	7
Papillomatous ovarian cyst	..	5	..	..	..	5
Cystic degeneration of ovary	..	1	..	..	..	1
Dermoid cyst	..	3	..	..	..	3
New Growths: Fibro-sarcoma	..	1	..	..	..	1
Carcinoma	..	..	..	..	1	1
Ovarian tumor	..	1	..	..	..	1
	..	21	..	..	1	22
Pelvic Peritoneum and Cellular Tissues.						
Parametric abscess	..	1	..	..	..	1
Pelvic peritonitis and parametritis	1	1	..	1	1	2
Extraperitoneal abscess	..	1	..	..	..	1
Cyst of broad ligament	..	1	..	..	..	1
Pelvic abscess	..	8	..	..	..	8
" exudate	9	..	..	..	..	9
" cellulitis	1	..	..	1	..	1
	11	12	..	2	1	23
Appendicitis.						
Gangrenous appendicitis with abscess	..	1	..	..	..	1
Chronic appendicitis	..	5	..	..	..	5
	..	6	..	..	..	6
Miscellaneous.						
Inguinal hernia	..	2	..	..	..	2
Appendicitis abscess, liver abscess, fibroid, empyema, peri-ureteral abscess	..	..	..	..	1	1
Appendicitis, pelvic peritonitis	..	..	..	..	1	1
Umbilical hernia	..	1	..	..	..	1
Ventral hernia	..	2	..	..	..	2
Cholelithiasis, carcinoma of duodenum and pancreas, metastases in liver	..	..	..	..	1	1
Carcinoma of sigmoid	..	1	..	..	..	1
" " omentum	1	..	1	..	..	1
Recurrent carcinoma of pelvis	1	..	..	1	..	1
Epithelioma of groin	..	..	..	1	..	1
Abdominal adhesions	..	1	..	..	..	1

Miscellaneous—*(Continued).*	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Post-operative adhesions	1	..	1	..	..	1
Inguinal abscess	..	1	..	..	..	1
Irritating suture of abdominal wound	..	1	..	..	..	1
Puerperal phlegmon of leg	..	1	..	..	..	1
" sapremia	1	1	..	..	..	1
" sepsis	2	1	..	..	1	2
Hyperemesis of pregnancy	1	..	..	1	..	1
Dystocia of pregnancy	..	2	..	..	..	2
Diabetes	..	..	..	..	1	1
Auto-intoxication	1	1	..	..	..	1
Anemia	1	..	..	1	..	1
Neurasthenia	2	1	1	..	..	2
Empyema	1	..	..	1	..	1
	12	16	3	5	5	29

OPERATIONS.

Vulva (6 operations).

Excision of epithelioma of vulva 1
" " Bartholinian cyst 2
Cauterization of vulva 1
Partial excision of imperforate hymen 1
Incision and drainage of Bartholinian abscess 1

Urethra and Bladder (2 operations).

Excision of urethral papilloma 1
Cystostomy for incrustation on bladder wall 1
Cystoscopy 1

Vagina (106 operations).

Anterior colporrhaphy 41
Posterior " 47
Vaginal fixation of uterus for cystocele 10
" suturing of round ligaments 2
Excision of fistulous tract and dilatation 1
Curettage of fistulous tract 1
Dilatation for vaginismus 1
" " atresia 1
Abdominal and vaginal plastic for atresia 1
Plastic for vesico-vaginal fistula 1

Perineum (10 operations).

Perineorrhaphy 8
Lawson-Tait for complete laceration 2

Rectum (9 operations).

Clamp and cautery for hemorrhoids	5
Incision and drainage of fistula in ano	2
Resection and enterorrhaphy for carcinoma	1
Excision of lower portion of rectum—plastic on vagina	1

Uterus (360 operations).

Cervix (64 operations).

Amputation of cervix	53
Plastic on cervix	1
Partial amputation of cervix	1
Dudley	5
Curettage and paquelinization for carcinoma	4

Body (296 operations).

Curettage for incomplete abortion, inevitable abortion, post-abortive endometritis, chronic endometritis, metritis	195
Dilatation for pyometra	1
Avulsion of submucous polyp	1
Torsion and avulsion of polyp	1
Excision of polyp	2
Cauterization and curettage for carcinoma	1
Accouchement forcé	3
Abdominal pan-hysterectomy	13
" " " for fibroids	19
" " " " carcinoma	3
" " " " double pyosalpinx	2
" hysterectomy for fibroids	16
" " " diseased adnexa	3
Vaginal pan-hysterectomy for prolapse	1
" hysterectomy for fibroids	5
" " " prolapse	2
Myomectomy	2
Avulsion of submucous fibroid (diabetic coma)	1
Alexander's operation	1
Ventral fixation	13
" suspension of round ligaments	10
Secondary laparotomy for hemorrhage	1

Ovaries and Tubes, Pelvic Peritoneum and Cellular Tissue (110 operations).

Salpingo-oöphorectomy for diseased adnexa	17
" " " pyosalpinx	2
" " " intraligamentous cyst	2
" " " fibro-sarcoma	1
" " " tubo-ovarian abscess	2
Double salpingo-oöphorectomy	23
" " " partial	12
" salpingectomy	2
Oöphorectomy for ovarian cyst	4
Double oöphorectomy	1
Excision of intraligamentous cyst	1
" " ovarian cyst	2

Ovaries and Tubes, Pelvic Peritoneum and Cellular Tissue—*(Continued).*

Incision and drainage for extraperitoneal abscess	1
Laparotomy for parametritis	1
Anterior vaginal section	1
Posterior " "	27
Ectopic gestation—Salpingo-oöphorectomy	7
Double salpingo-oöphorectomy	1
Salpingectomy	3

Miscellaneous (47 operations).

Appendicectomy	22
" and drainage	3
" " excision of cecum for cyst	1
" " Bassini	1
" " hernioplasty, ventral	1
Hernioplasty, ventral	3
" umbilical	1
" Bassini	1
Laparatomy, exploratory	2
" for closure of fecal fistula	1
Excision of foreign body in abdominal wall	1
Enterorrhaphy	1
Resection of sigmoid flexure of colon	1
Cholecystectomy and drainage	1
Incision and drainage of liver abscess	1
" " " " periureteral abscess	1
" " " " pelvic abscess	1
" " " " inguinal abscess	1
" " " " abscess of thigh	1
" " " for secondary epithelioma of groin	1
Thoracotomy for empyema	1

UTERUS DIDELPHYS WITH ENORMOUS DILATATION OF RIGHT CERVIX WITH BLOOD FORMING A TUMOR SIMULATING A FIBROID GROWTH IN THE CERVIX.

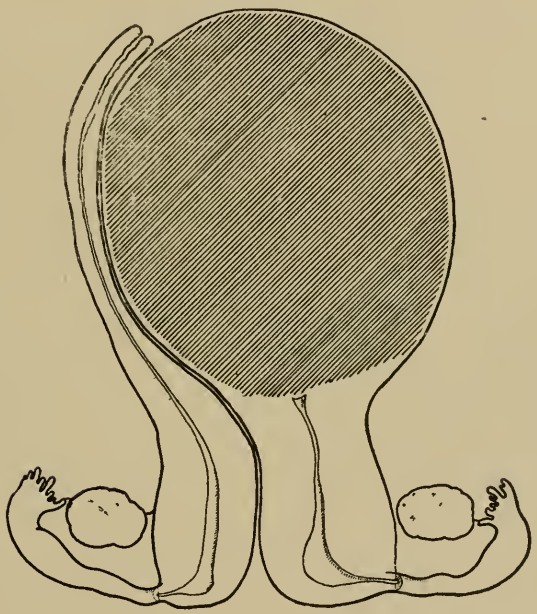
By Hiram N. Vineberg, M.D.

ADJUNCT GYNECOLOGIST.

Miss I. B., aged 18, single, had typhoid fever at 13 years, no other acute illness. Began to menstruate at 14 years, four-weekly type, regular, amount moderate, attended with slight backache. For four months prior to admission into Mt. Sinai Hospital, September 25th, 1906, began to suffer from difficulty in voiding urine and from a feeling of weight in the hypogastrium. She was of medium size. External genitals normally developed. Vagina copious and of usual length. On bimanual examination, a globular tumor, size of a large cocoanut, was found occupying the pelvic cavity anteriorly and bulging considerably against the anterior vaginal wall. The tumor was fairly movable and projecting from its superior surface a body corresponding in size to the uterus was felt. On vaginal inspection with a speculum, a small circular opening was seen at the left side of the tumor. A sound entered this and passed toward the left side for a distance of about three inches. The diagnosis was made of a large submucous fibroid distending the lower part of the uterine cavity and dilating the cervical canal. September 28th abdominal section was made. When the abdomen was opened, it was seen that there were two uterine cornua, both fully developed, but the right was the larger of the two. Apparently, springing from a common cervix was a globular tumor of the size above stated (large cocoanut), dipping into the pelvic cavity. After tying off both ovarian vessels and the round ligament, the vesico-uterine fold was cut through and the bladder pushed down from the anterior surface of the tumor. An attempt was now made to deliver the tumor, but this was found impossible. It was then decided to bisect the tumor, so as to facilitate its removal. On cutting through the fibrous tissue for the depth of about half an inch, to my great surprise, thick, tarry blood appeared and then the true nature of the condition dawned upon me. Both uteri and cervices were then removed. The removed specimen (*vide drawing*) showed that there were two uterine bodies, each with its tube and ovary and complete cervix. The os of the right cervix

possessed no aperture, and the menstrual blood collected in the cervix, distending it to the dimension above stated. The patient made an uneventful recovery.

Abnormal development of the female genital organs, resulting in various kinds of deformities, is not very uncommon. In glancing through the literature only a few cases, however, were found presenting similar conditions to the one here described. The case is



presented on account of its rarity, and because of the mistaken diagnosis. Even with the abdomen open, and being able to inspect the parts thoroughly, the true condition was not suspected. Having found an abnormal development of the uterine body, I admit, I should have been thrown upon my guard and suspected further abnormalities. But the tumor looked and felt so much like a fibroid growth and having had a similar looking growth in the cervix which

proved to be a fibroid, a few weeks before, my suspicion was not aroused. A colleague, a fellow of the New York Obstetric Society, who was present at the operation, and who had a good view of the pelvic contents, formed the same opinion of the condition as I did.

The case is, therefore, placed upon record for the purpose of statistics, and with the view of preventing some one else from falling into a similar error.

REPORT OF TWO CASES OF CHORIO-EPITHELIOMA MALIGNUM; HYSTERECTOMY; RECOVERY.

By Hiram N. Vineberg, M.D.
ADJUNCT GYNECOLOGIST.

In accordance with the customary experiences that rare conditions frequently occur together, it has been my lot to meet with two cases of chorio-epithelioma malignum within two months of each other. As far as I know, I had not come across this condition, either in my private or public practice, before. As I had in my professional work treated a number of cases of hydatid mole without the subsequent development of this malignant growth, as far as I knew, I had begun to think that in this country the association of the two conditions, hydatid mole and chorio-epithelioma was not as common as in Germany. The experiences that I have just had have shaken my former convictions considerably. Still, Dr. Robert T. Frank (*New York Medical Journal*, April, 1906) was able to collect only 28 cases reported in this country. Doubtless, many cases have been overlooked, or were not properly interpreted. When visiting Strassburg's Universitäts Frauen-Klinik a couple of years ago, Schickele pointed out to me a uterus that had been removed four or five years before and the microscopic diagnosis was sarcoma. With the awakened interest in chorio-epithelioma he re-examined the specimen microscopically and found it to be an undoubted instance of that condition. If this could occur in the home of W. H. Freund and of v. Recklinghausen, it is safe to conjecture that it has frequently happened in medical centers where the pathological investigation of surgical specimens is not carried out with the same thoroughness as it is in Germany.

Case I.—Mrs. E. R., a patient of Dr. Altman's, was seen by me January 4th, 1907. She was 47 years old, married 26 years, had had eight children, the last seven years ago, one miscarriage 16 years ago. She had been in the enjoyment of good health, and menstruation had been normal until the present illness. Her last regular men-

struation occurred September 27th, 1906. On November 10th, when she was 17 days overdue, a bloody flow occurred, resembling in amount and duration her usual menses. But the blood did not cease entirely. She continued staining and 12 days before I saw her she had a profuse flow lasting one day, and passed several large clots. She had no abdominal pain until the day of my visit, when she referred it to the lower part of the abdomen and stated that it was moderately severe. Three weeks before, while mounting a flight of stairs she felt a severe fluttering in the cardiac region, and suffered from shortness of breath. Has suffered, more or less, from similar symptoms since then and complained of great weakness. Swelling of the feet and legs was noted about this time and the swelling has kept on increasing until now. Had taken to bed the day before on account of general debility and the unwieldy size of the feet and legs. She was extremely anemic, her breathing rapid and shallow, pulse rapid and rather bounding. There was a soft blowing murmur accompanying the first sound and the cardiac impulse was diffuse; cardiac dulness considerably increased. The abdomen was occupied by a spherical smooth tumor, reaching to the upper border of the umbilicus. On bimanual examination, the cervix was found soft and moderately patulous and passed into the abdominal tumor. The breast nipples were surrounded by a dark areola but no colostrum was found. The urine contained a large quantity of albumen and numerous granular and hyaline casts. The diagnosis was made of a probable pregnancy of an abnormal type, or a fibroid growth undergoing sarcomatous degeneration. The advice was given to have the patient enter Mt. Sinai Hospital, and under anesthesia to explore the uterine cavity. This was done on January 9th, and although only a few days elapsed since I had examined the patient, the uterine tumor had markedly increased in size, so that now it reached midway between the umbilicus and the ensiform cartilage. As soon as I could introduce the index finger into the uterine cavity, after dilating the cervix, and it encountered a soft, mushy material, I recognized I had to deal with a hydatidform degeneration of the chorion. I rapidly emptied the uterus of its contents, making certain that all the hydatid material was removed. The patient made a surprisingly good recovery. Her cardiac and pulmonary symptoms disappeared within a few days. The albumen in the urine rapidly disappeared and the casts gradually grew less.

There was a slight bloody flow for four or five days, then a mucopurulent flow for four or five days longer, and after that there was no discharge of any kind. The patient returned home and was gradually gaining in weight and improving in color, when on February 1st she was suddenly seized with a profuse uterine hemorrhage.

I advised the attending physician to pack the vagina and to make immediate arrangements for the patient to be readmitted to the hospital. I saw her two days later. She was considerably exsanguinated. In replacing the vaginal gauze there was a very severe hemorrhage. I rapidly stuffed some gauze into the uterine cavity and repacked the vagina tightly. From the clinical history and finding an enlarged, hard uterus with closed cervix, I diagnosed chorio-epithelioma malignum. On the day following, February 4th, I performed an abdominal panhysterectomy, not deeming it safe to tamper with the case by first curetting and submitting the scrapings to a microscopic examination. She made an uneventful recovery from the operation.

Pathological Report.—(Specimen consists of uterus and adnexa.) The uterus is very pale. Length of body 2.5 cm., width just below fundus 11 cm., length of cervix 4 cm. The organ is very firm, the serosa smooth. There is a slight lateral laceration on the right side of the posterior lip of the cervix. The walls of the fundus measure 3 cm. in thickness at the widest part. The muscular tissue is intersected by numerous bands of connective tissue that coalesce near the mucous to form a more continuous broad band. The mucous lining both the body and cervix is smooth, excepting at the internal os where there is a slight swelling and congestion, and at the point of entrance of the Fallopian tube. At the latter site there is a bean-shaped mass 1.5 cm. in length, projecting into the lumen of the organ. This tumor is mottled in color, red and white, soft and friable. The underlying muscular tissue is softer than that of the remainder of the uterus, and is also friable. The hemorrhagic areas are, however, confined to the tumor itself, and are not found in the underlying muscular tissue. The right ovary is normal in size. The left ovary contains two large cysts, one about 1.5, the other about 2 cm. in diameter. Both Fallopian tubes are negative.

Microscopically, the tumor consists of both syncitial masses and Langhans cells. The former are arranged in plaques and in bands, in some places forming a fine meshed reticulum. The spaces thus formed are frequently filled with red blood corpuscles, or contain one or more cells of the syncitial or Langhans type. The former are irregularly shaped, deeply staining, the outlines of the cell not always clearly defined. The nuclei are also irregular, and stain with great intensity. Frequently these cells contain two, three or four nuclei. The Langhans cells stain faintly, and have a sharply defined outline. The nuclei are round or oval, and vesicular. The greater part of the tumor is composed of the above syncitial masses, but at one point there is a large mass of Langhans cells. Large hemorrhages are scattered throughout the tumor. At some points

the syncitial cells lie close to the walls of blood-vessels or lymph spaces, an occasional cell being present within the lumen itself. The tumor infiltrates the musculature of the uterus for about one-third of its thickness. Scattered between the syncitial masses are numerous leucocytes, while surrounding the entire area of tumor tissue there is a marked round-celled infiltration. Between the tumor and the lumen of the uterus there is a thin band of necrotic tissue enclosing leucocytes and the remains of a few uterine glands. The walls of the blood-vessels of the uterus have undergone hyaline degeneration.

Both ovaries show a number of corpora lutea in which the lutein cells are proliferated. These bodies are small with the exception of one that lies in the midst of the dense tissue of the atrophic ovary. Here there is very marked proliferation of the lutein cells, many of which contain large granules of yellowish pigment. At the periphery of the corpus there are rather numerous distended blood-vessels with thin walls. There are no evidences of organization present.

Dr. Herbert L. Celler,
Assistant Pathologist, Mt. Sinai Hospital.

Diagnosis kindly verified by Dr. F. S. Mandlebaum, Pathologist.

Case II.—G. H., admitted from the dispensary service into Mt. Sinai Hospital. She was 47 years of age, married 28 years, had nine children, last child eight years ago, two miscarriages, last one nine years ago. Menses had always been regular, moderate in amount, lasting from three to five days, and not attended with pain. Seven days before her admission into the hospital she began to bleed. She was then two weeks overdue. The bleeding persisted and at times was quite profuse. She looked rather old for the age given and was moderately anemic. Her general condition, otherwise, was good. On bimanual examination, the uterus was found reaching to within two finger-breadths of the umbilicus and was rather hard to the touch. There was a bluish discoloration of the vagina, and milk could be expressed from the nipples. Dr. F. Krug confirmed the diagnosis of hydatid mole, which was made in my service in the dispensary. He curetted the patient himself, removing a large quantity of hydatid material. The patient made a good recovery and was discharged March 3, with the instruction to return if uterine bleeding recurred. At the time of her discharge the uterus was nearly normal in size. On March 28 she returned to the hospital with the statement that soon after she left the hospital the bleeding recurred, and it has gradually been growing more profuse. The uterus was now found to be considerably enlarged, corresponding in size to the gravid organ at about the sixth week. A diagnosis of chorio-epi-

thelioma was made and on March 30th the uterus was removed by me per vaginam.

April 8.—Patient made an uneventful recovery and is sitting up out of bed.

Report on specimen by Dr. F. S. Mandlebaum, Pathologist to Mt. Sinai Hospital.—Specimen consists of uterus and adnexa. Uterus enlarged, 11x9. 5x5 cm. Wall measures 17-30 mm. in thickness. Occupying the posterior wall and extending downwards from the fundus for a distance of 48 mm., there is a growth which fills up and slightly distends the uterine cavity. On either side the growth extends to the openings of the Fallopian tubes, elevating the mucous membrane and causing it to slope downwards to the opening. The tumor is sessile. Its edges are overhanging, except at the upper half. The surface of the tumor is irregular and ulcerated and microscopic section shows it to be chorio-epithelioma malignum.

STATISTICS OF EYE AND EAR SERVICE.

1905-1906.

EMIL GRUENING,
ATTENDING SURGEON.

CHAS. H. MAY, CARL KOLLER,
ADJUNCT ATTENDING SURGEONS.

Diseases of the Eye.	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Trachoma	..	9	..	..	..	9
Chronic conjunctivitis	2	..	..	..	..	2
Vernal catarrh	..	2	..	..	..	2
Lacerated wound of upper eyelid	1	2	..	..	..	2
Distichiasis	..	2	..	..	..	2
Double congenital ptosis	..	3	..	..	..	3
Syphilitic tarsitis	1	1	..	..	..	1
Cicatricial ectropion of upper and lower lid	..	1	..	..	..	1
Supraorbital dermoid cyst	..	2	..	..	..	2
" abscess	..	1	..	..	..	1
Orbital cellulitis	1	1	..	..	..	1
" " streptococcus meningitis, streptococcemia	..	..	..	..	1	1
Acute frontal sinusitis	..	1	..	..	..	1
Atrophy of conjunctivæ, after enucleation	..	2	..	..	..	2
Chronic dacryocystitis	..	3	..	..	..	3
Contusion of eyeball	..	2	1	..	..	3
Internal strabismus	..	18	..	..	..	18
External strabismus	..	4	..	..	..	4
Pterygium	..	1	..	..	..	1
Fascicular keratitis	1	2	..	..	..	2
Keratitis filamentosa	..	1	..	..	..	1
Iridokeratitis	1	1	..	..	..	1
Interstitial keratitis	2	..	2	..	..	2
Hypopyon keratis in glaucoma	1	..	..	1	..	1
Opacities of cornea	1	..	..	1	..	1
Impacted foreign bodies in cornea and sclera	..	2	..	..	..	2
Ulcus serpens of cornea	1	1	1	..	..	2
Perforated wound of cornea	1	..	1	..	..	1
" " " " —staphyloma	..	..	1	..	..	1
Traumatic prolapse of iris	..	..	1	..	..	1
Acute iritis	1	1	..	..	..	1
Syphilitic iritis	4	..	4	..	..	4
Exclusion of the pupil	..	2	..	..	..	2
Iridochoroiditis with tension	..	..	1	..	..	1
Traumatic dislocation of the lens	1	1	..	..	..	1
Senile cataract	..	18	..	..	..	18

Diseases of the Eye—*(Continued).*	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Zonular cataract	..	4	..	..	..	4
Traumatic cataract	1	5	1	1	..	7
Senile cataract with iridocyclitis	..	..	..	1	..	1
Subacute choroiditis	3	..	3	..	..	3
Sarcoma of the choroid	..	1	..	..	..	1
Acute iridochoroiditis	1	1	..	..	..	1
Acute glaucoma	..	3	..	..	..	3
Subacute glaucoma	..	4	..	..	..	4
Chronic glaucoma	..	8	..	..	..	8
Double acute glaucoma	..	1	..	..	..	1
Chronic glaucoma, trachoma	1	..	1	..	..	1
Detachment of the retina	1	..	2	..	..	2
Panophthalmitis	1	..	1	..	..	1
Traumatic iridocyclitis	..	6	..	..	..	6
Iridocyclitis	2	1	1	..	..	2
Diabetic iridocyclitis	1	..	1	..	..	1

Total number of cataracts..... 30

Operations on the Eye.

Expression of trachomatous follicles	9
Removal of growths of vernal catarrh	2
Suture of lacerated wound of upper eyelid	1
Hotz operation for distichiasis	2
Partial tarsectomy for double congenital ptosis	3
Plastic for cicatricial ectropion of upper and lower lid	1
Excision of supraorbital dermoid cyst	2
Incision and drainage of supraorbital abscess	1
" " " " orbital cellulitis	1
" " " " acute frontal sinusitis	1
Plastic on atrophy of conjunctivæ after enucleation	2
Excision of lacrymal sac	3
Tenotomy of internal rectus	22
Advancement of internal rectus	1
Tenotomy of external rectus	5
Advancement of external rectus	10
Excision of pterygium	1
Curetting of fascicular keratitis	1
" " keratitis filamentosa	1
Removal of impacted foreign bodies in cornea and sclera	2
Curetting of ulcus serpens of cornea	1
Repeated cauterization of staphyloma complicating perforated wound of cornea	1
Excision of traumatic prolapse of iris	1
Iridotomy for seclusion of the pupil	2
Iridectomy for iridochoroiditis with tension	1
Extraction of senile cataract	15

Operations on the Eye—*(Continued).*

Extractions of senile cataract, with iridectomy	2
Discissions for traumatic cataract	8
Extraction of traumatic cataract	3
Discissions for zonular cataract	9
Extraction of zonular cataract	1
Enucleation for sarcoma of the choroid	1
Iridectomy for acute, subacute, chronic glaucoma	16
Double iridectomy for double acute glaucoma	1
Cauterization for detachment of the retina	1
Enucleation for traumatic iridocyclitis	6

Diseases of the Mastoid.	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Acute mastoiditis	..	21	..	..	..	21
" " with abscess	..	13	..	..	..	13
" " " Bezold's abscess	..	2	..	..	..	2
Subacute mastoiditis	..	3	..	..	..	3
Mastoid fistula	..	4	..	..	..	4
Chronic mastoiditis	..	4	..	..	..	4
Acute mastoiditis, sinus thrombosis	..	3	..	..	2	5
" " " " streptococcemia	..	1	..	..	1	2
" " " " " pyemia	..	1	..	..	..	1
" " extradural abscess, Bezold's abscess	..	2	..	..	..	2
" " subdural abscess	..	1	..	..	..	1
" " purulent meningitis	..	..	..	..	2	2
Chronic mastoiditis, sinus thrombosis	..	..	..	..	1	1
" " brain abscess, meningitis	..	..	..	..	3	3
" " extradural abscess	..	1	..	..	..	1
Acute mastoiditis, diphtheritic otitis media	1	..	..	1	..	1
" " extradural abscess, sinus thrombosis	..	1	..	..	..	1
" " with abscess, diabetes	..	..	..	..	1	1
Subacute mastoiditis, cerebellar abscess	..	..	..	..	1	1
Double acute mastoiditis	..	3	..	..	..	3
" " " sinus thrombosis	..	1	..	..	..	1
Chronic mastoiditis, tumor of the brain	1	..	..	1	..	1

Total number of mastoids.....74

Operations on the Mastoid.

Osteotomy and drainage for acute mastoiditis, acute mastoiditis with abscess, double acute mastoiditis, subacute mastoiditis	41
Incision and drainage of mastoid abscess, followed subsequently by osteotomy	9
Incision and drainage of mastoid abscess, in diabetes	1
Radical operation for chronic mastoiditis and mastoid fistula	6
Revision of mastoid fistula	2
Osteotomy and drainage for acute mastoiditis—drainage of extradural abscess (3), subdural abscess (1), purulent meningitis (2)	6

Operations on the Mastoid—*(Continued).*

Osteotomy and drainage for mastoiditis; incision of lateral sinus with evacuation of clot and drainage; excision of internal jugular vein and drainage 11
Osteotomy and drainage for mastoiditis; craniotomy and drainage of brain abscess (temporo-sphenoidal) 3
Osteotomy and drainage for mastoiditis; cranitomy and drainage of cerebellar abscess 1
Exploration of the mastoid 3

Diseases of the Middle and External Ear.	Not operated.	Cured.	Improved.	Unimproved.	Died.	Total.
Acute purulent otitis media	..	2	..	..	..	2
Chronic purulent otitis media	..	5	4	..	..	9
Subacute double otitis media	1	1	..	..	..	1
Furunculosis of external auditory canal	..	2	..	..	..	2
Polyps of external auditory canal	..	2	..	..	..	2
Otitis externa	2	2	..	..	..	2
" " exfolitiva	1	1	..	..	..	1
" " purulenta	..	3	..	..	..	3
Abscess of post-auricular gland	..	2	..	..	..	2

Operations on the Middle and External Ear.

Thyringotomy for acute and chronic otitis media 11
Removal of polyps 2
Incision and drainage of furuncles of external auditory canal 2
" " " " purulent otitis externa 3
" " " " abscess of post-auricular gland 2

STATISTICAL REPORT OF THE GENITO-URINARY SERVICE.

HERMANN GOLDENBERG, M.D.,
ATTENDING SURGEON.

MARTIN W. WARE, M.D.,
ADJUNCT ATTENDING SURGEON.

	Total.	Cured.	Improved.	Unimproved.	Died.
Diseases of the Penis.					
Phimosis	1	1	..	..	..
Paraphimosis	2	2	..	..	..
Chancre	5	1	..	4	..
Chancroid	2	..	2	..	..
Hypospadias	1	1	1	..	..
Rupture of corpora cavernosa	1	1	..	..	..
Diseases of the Urethra.					
Cowperitis	1	1	..	..	..
Fistula	2	..	..	1	1
Abscess, periurethral	4	3	..	1	..
Papilloma	2	1	..	1	..
Polyp	2	..	2	..	..
Stricture	30	21	5	3	1
Urethritis	9	4	4	1	..
Diseases of the Prostate.					
Hypertrophy	59	24	17	9	9
Carcinoma	2	..	1	..	1
Calculus	1	..	..	1	..
Abscess	1	..	..	1	..
Tuberculosis	4	1	1	1	1
Diseases of the Bladder.					
Calculus	18	9	2	6	1
Carcinoma	11	5	4	1	1
Contracted bladder	3	1	1	1	..
Cystitis (undetermined)	10	4	3	3	..
" tuberculosis	6	..	..	5	1
Distoma hematobium	1	..	..	1	..
Fistula, suprapubic	3	1	1	1	..
Ulcer	2	..	2	..	..
Syphilis	1	..	1	..	..
Paralysis (spinal syphilis)	2	..	1	1	..

Diseases of the Kidney and Ureter.	Total.	Cured.	Improved.	Unimproved	Died.
Hematuria—renal unilateral	3	2	1	..	..
Pyonephrosis	2	..	2	..	..
Pyelitis	5	1	2	1	1
Renal calculus	2	1	..	1	..
" tuberculosis	9	3	3	3	..
Ureteral calculus	1	1	..	..	..
Diseases of the Testicle.					
Epididymitis, gonorrheal	39	26	12	1	..
" tuberculous unilateral	20	12	6	2	..
" " bilateral	3	1	..	1	1
Gumma	6	5	..	1	..
Infarct and torsion	2	2	..	..	..
Hydrocele	42	41	..	1	..
Necrosis	1	1	..	..	..
Orchitis, traumatic	1	1	..	..	..
Varicocele	34	31	..	3	..
Sarcoma	4	2	2	..	..
Undescended testes	3	3	..	..	..
Diseases of the Seminal Vesicles.					
Adenoma	1	..	1	..	..
Chronic vesiculitis	1	..	..	1	..
Diseases of the Scrotum.					
Cellulitis	1	1	..	..	..
Diseases of the Spermatic Cord.					
Tumor of the cord	1	1	..	..	..
Hydrocele of the cord	2	2	..	..	..
Hematocele	2	2	..	..	..
Spermatocele	1	1	..	..	..
Abscess, tunica vaginalis	2	2	..	..	..
Diseases of the Rectum.					
Hemorrhoids	6	5	..	1	..
Fistula in ano	6	6	..	..	..
Fissure in ano	2	2	..	..	..
Prolapse rectum	1	..	..	1	..
Ischio-rectal abscess	1	1	..	..	..
General Surgical Affections.					
Arthritis, gonorrheal	10	4	5	1	..

	Total.	Cured.	Improved.	Unimproved	Died.
Adenitis, chancroidal	4	4	..	..	..
Syphilis	3	..	..	3	..
Diabetes	1	..	..	1	..
Hernia	11	11	..	..	..
OPERATIONS.					
Operations on the Penis.					
Circumcision	2	2	..	..	..
Cauterization of chancroid	2	2	..	..	..
Plastic for hypospadias	3	2	..	1	..
Operations on the Urethra.					
Urethrotomy, external	8	8	..	..	..
" internal	6	6	..	..	..
" combined	6	6	..	..	..
Resection of urethra	1	..	1	..	..
Plastic for urethral fistula	2	1	1	..	..
Drainage for urethral abscess	4	4	..	..	..
Removal of papillomata	3	3	..	..	..
Operations on Bladder.					
Suprapubic cystotomy for calculus	5	4	..	..	1
" " " drainage	..	..	..	..	..
" " " neoplasm	10	7	1	1	1
" " " enlarged prostate	26	21	..	..	5
Lithotripsy	9	9	..	..	..
Perineal prostatectomy	3	3	..	..	..
Operations on Kidney and Ureter.					
Nephrectomy for tuberculosis of kidney	4	3	1	..	..
" " pyo-nephrosis	1	..	1	..	..
Nephrotomy	4	4	..	..	..
Ureterotomy for stone	1	1	..	..	..
Operations on Testicle.					
Orchidopexy	3	2	1	..	..
" unilateral, for torsion of cord	2	2	..	..	..
Castration, unilateral (for tuberculosis)	20	12	6	2	..
" bilateral (for tuberculosis)	3	2	..	..	1
" for necrosis testis	1	1	..	..	..
" " sarcoma of testis	4	2	2	..	..
Eversion of tunica vaginalis, for hydrocele	24	23	1	..	..
Excision " " " " "	3	3	..	..	..
Incision and drainage of tunica vaginalis, for hydrocele	15	15	..	..	..

	Total.	Cured.	Improved.	Unimproved	Died.
Operations on Rectum.					
Clamp and cautery for hemorrhoids	6	5	..	1	..
Division fistula in ano	6	6	..	..	..
Stretching sphincter for fissure	2	2	..	..	..
Ischio-rectal abscess drainage	1	1	..	..	..
Operations on Inguinal Lymph Nodes.					
Incision and drainage of inguinal glands	4	4	..	..	..
Operations on Inguinal Hernia.					
Bassini's operation	11	11	..	..	..

REPORT OF THE DEPARTMENT OF GENITO-URINARY SURGERY.

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STRICTURES OF THE URETHRA.

Of the thirty cases of stricture of the urethra admitted to the service, ten were amenable to dilatation, the remaining twenty were not so. Of these twenty patients eight were subjected to external, six to internal urethrotomy, and in six instances a combined external and internal urethrotomy was performed. A general anesthetic was employed in every instance. One attempt to use cocaine locally in the performance of a perineal section was abandoned because of the great pain incident to the extensive dissection called for in reaching the urethra strictured at the bulbo-membranous junction.

In more than fifty per cent. of the instances the ages of the patients operated was between forty and fifty years, and in all there was an antecedent history of gonorrhea.

The fourteen external urethrotomies were performed on patients whose stricture was located in the bulbo-membranous junction and beyond, and upon whom attempts at dilatation had failed. In all but three instances the perineal section was done upon a guide. The perineal drainage was continued for one week. At the expiration of this time the drain was withdrawn and sounds were passed three times a week. In a few instances a local anesthetic, or nitrous oxide, was employed for the first passage of the instrument. One death occurred in this series of fourteen cases due to an independent cause—tumor of the mediastinum—confirmed by autopsy.

For the internal urethrotomies, the Kohlman urethrotome cutting from behind forward was found to be very serviceable for strictures of

larger caliber. The lighter strictures were first divided by the Maissaneuve, followed by a freer division with the Gerster or Otis urethrotome. The hemorrhage in the cases of internal urethrotomy were not controllable by adrenalin, but were effectively checked by the employment of an indwelling catheter for twenty-four hours. One stricture of the anterior urethra was subjected to resection.

Resection of the urethra.—History. Patient aged 48. Two and a half years previously a stone impacted in the anterior urethra two inches from the meatus was removed by division of the urethra. The wound healed kindly, but difficulty of urination thereafter grew progressively until a very fine stream only could be passed. A very fine filiform engages the stricture at two inches from the meatus and is tightly gripped. The stricture underlies the cicatrix; it is adherent to it and feels like a shot. For this reason excision was decided upon. Under gas and ether anesthesia, one-half inch of urethra was resected and an end to end anastomosis performed. The deeper sutures were of catgut, the superficial ones of silk. A catheter a demeure, No. 13 F, was left in place. A slight infection of the wound resulted, necessitating the removal of some stitches. On the eighth day a 22 F sound was passed. At the time of discharge a 25 F was accommodated. *Within three months* the patient returned with a stricture at the same level, which could not be threaded with a 21 F bougie. The stricture this time was divided with the Maissaneuve instrument. We evidently had to deal here with a tendency to keloid formation.

Two strictures following prostatectomy will be referred to later.

Vesical Polyp.—Removed by Perineal Section.

The above case has been singled out from the bladder tumors because of the extraordinary features to be detailed.

H. L., aged 52. Family history negative. Denies gonorrhea and syphilis.

First hemorrhage occurred four years ago during urination. Thereafter frequent urination set in with pain during and after the act. Frequency every half-hour, day and night, and pain in the perineum and suprapubic region. The patient has grown thin within the past three years.

Examination.—Bladder capacity, 300-400 c.c. Cystoscopy. The entire left side appeared to be taken up with a mass in the center of which the ureteral orifice could be seen. One week later a hemor-

rhage from the urethra occurred in the intervals between micturition. Endoscopic examination: A cauliflower growth seen to occupy the greater part of the posterior and prostatic urethra.

Perineal Section: Curved transperineal incision. A part of the growth the size of a plum prolapsed through the divided urethra Its pedicle tapered, and with the finger, introduced into the urethra, it was followed up to its insertion into the bladder. The incision into the urethra was enlarged, extending backward. By traction on the tumor, the pedicle at its insertion was brought into view. A ligature of chromic gut was thrown about its base. Perenial drainage was practiced for a few days. On the 19th day the patient was discharged with a minute opening in the perineum. The cachexia of the patient subsequently became very marked and he was too enfeebled to receive even out-door care.

Pathological Report: Angeiomatous-polyp Adenocarcinoma.

Hypospadias.—For the cure of this congenital defect the urethroplastic operation of Beck-Von Hacker was performed three times. Twice it was effective. In none of the instances was a permanent catheter employed. In the third case we have to report a failure. It was a case of urethral fistula, following improperly performed ritual circumcision. The fistula was in the sulcus, back of the corona glandis. All the urine escaped from this orifice and none from the short section of urethra in the glans. It was decided, owing to the location of the fistula, to regard this defect as a traumatic hypospadias and apply the Beck transplantation of the urethra. The vesical end of the urethra was mobilized for the extent of one inch. The mucous membrane lining the canal in the glans penis was destroyed and the mobilized urethra drawn through the glans and secured with silk stitches. After the third day the sutures gave way, retraction of the urethra occurred and the fistulous opening of the penis again resulted. The main factor very likely responsible for the failure was insufficient mobilization of the urethra, and the fact that the glans penis was lined with mucous membrane, which prevented proper adhesion of the transplanted urethra.

Torsion of the Spermatic Cord and Infarct of the Testis.

The above two cases are rendered in detail. The first because it was diagnosticated before operation by its pregnant symptoms and

the second case in contrast, because it was operated upon under the assumed diagnosis of tuberculosis testis.

N. O., aged 19. Family history: No tuberculosis; no measles or exanthemata. Had a phlegmon, which was operated upon five years ago. Denies gonorrhea and syphilis.

Personal history.—Patient always noticed ascent and descent of the the testis. It is questionable whether the testis wholly disappeared and entered the abdomen.

Personal History.—Patient always noticed ascent and descent of days ago. Suddenly, without traumatism, a lump appeared in the right groin. It grew in size and became painful. Vomiting set in and the bowels moved. At this stage the physician in attendance diagnosticated strangulated hernia, and in attempts to reduce it, brought the swelling further down. Temperature on admission was 99 F., pulse, 76-90. Heart and lungs normal. Left testicle normal in the scrotum. Right testicle appears as a swollen, hard, very elastic and tender mass standing out prominently just below the external ring. The percussion note over it is dull. The tumor is immovable. Below this solid mass, in the scrotum, a soft, fluctuating and not very tense swelling is to be distinguished. No impulse on coughing. Diagnosis: strangulated testis. Operation, incision from the scrotum to the ring. The tunica vaginalis is opened and found to contain blood. The testis is smooth, glossy, and dark, red-black in places. Its shape perfectly retained. Its position horizontal. The epididymis was mushy and had lost its shape completely. The tunica vaginalis prolonged into a finger-like pouch below, filled with bloody serum. The cord was found twisted one and a half times from left to right. The entire testis was infarcted, and the vessels of the cord were thrombosed, and the testis was therefor sacrificed.

S. K., aged 18. No family history of tuberculosis. No hemophilia or sweats; no traumatism. Has lost some weight. Claims to have had an attack like the present one five years ago. Prior to that time had no intercourse. That attack was of two days' duration.

Present History.—Eight days ago the testicle became swollen and painful. No urinary symptoms preceded this and no urethral discharge was noticeable.

Examination.—Urine clear. A soft systolic murmur at the apex.

The left testis presents an enlarged epididymis adherent to the scrotum. No fluctuation. Prostate per rectum feels normal.

Treatment.—Testicle strapped, and iodide of potassium given for five days. The adhesive straps were removed and the testis found unchanged, and the pain and tenderness persisted. An injection of tuberculin given for diagnostic purposes was not followed by any reaction. Operation was undertaken for a suspicion of tuberculosis. Incision over the cord at the entrance to the ring. Upon removal of testis the orchis and epididymis were found hemorrhagic.

Pathological Report.—Infarction of the testis. No twisting of the structures of the cord. Epicrisis. There is a possibility that this infarction was embolic and perhaps the systolic murmur of the heart, indicative of organic valvular lesion, had the causal relation.

PROSTATECTOMIES PERFORMED IN THE GENITO-URINARY SERVICE.

Before entering upon a brief report of the cases on which we performed prostatectomy, from December, 1904, until December, 1906, we wish to state that whenever possible, we have employed cystoscopy, prior to the operation. We do not share the opinions of those who consider it a method fraught with danger to the patient, but are convinced of its usefulness even in cases where the bladder is opened suprapubically. We believe that in one case which came under our observation three months after a suprapubic prostatectomy, performed by a well-known operator, a stone in the bladder had been overlooked, which would not have happened, had cystoscopy been employed. It is our rule, when a patient is admitted for retention of urine, to employ first catheterization, generally in the form of the permanent catheter and only to operate if the patient fails to respond to conservative measures. It is needless to state that every patient is subjected to an examination for a spinal lesion as an etiological factor for the retention or incontinence; in doubtful cases we have availed ourselves of the counsel of the neurologist.

In most of our cases we have performed suprapubic prostatectomy, which we consider the method of choice. The field of the operation is anatomically much simpler and the operation technically easier than in the perineal method. It is furthermore free from such serious objections as operative or postoperative traumatism of the rectum, which we have encountered in the perineal operation. As to the technique of the operation, we have employed the method popularized by Freyer. The after treatment plays a very important part.

Our mortality of 17½% is rather high, but is partly due to the fact that the prostatics, who have entered our ward, have generally been treated outside. They come under our observation, as bad surgical risks, often septic, and with false passages after futile attempts of catheterization. On the other hand, we frankly admit that some of the fatal results are due to errors in judgment on our part, errors of commission and omission, which, with more experience, we have learned to avoid, so that we have operated on the last nineteen cases of this series without a death. We warmly advocate the operation in two stages, suprapubic cystotomy under local, and secondary prostatectomy under general anesthesia, where the condition of the patient does not warrant the operative risk of primary prostatectomy. Especially in acute retention it is best to relieve primarily the retention and the strain on bladder, ureters and kidneys.

Our functional results have been excellent, and have been maintained in all our patients who subsequently returned for inspection. The potentia coeundi was—whenever present before the operation—left intact, in some of the cases even better than before the operation. In two cases, where it was preserved, there was no spontaneous emission, but the semen was found in the urine, voided after cohabitation, a welcome outcome in one case where the patient had practiced coitus reservatus for years to prevent conception in his youthful wife. In neither of these cases was there a stricture of the urethra, since large-sized sounds could be passed with ease. The disturbance of the ejaculation was probably due to deviations of the colliculus seminalis, caused by the operation.

Case I.—*Suprapubic prostatectomy; cure.*—H. M., 56 years old, was admitted on December 20, 1904, with retention and incontinence. He has had frequency and difficulty of urination for three years. Four weeks before admission he was unable to void any urine. On December 28th, two large lateral and a large median lobe were removed. Postoperative hemorrhage on the evening of the operation required packing of the bladder through the suprapubic wound. The patient reacted well and urinated on January 19th. Recovery retarded through suprapubic fistula, which closed on February 23d. He was discharged cured on February 26th. He urinates in a good stream every three to four hours. No residual urine.

Case II.—*Suprapubic prostatectomy; death through sepsis.*—C. F., 62 years old, has disturbance of urination for the last ten years, acute

retention for ten days. Before admission, January 8, 1905, various attempts had been made to catheterize the patient, and had resulted in false passages. Catheterization, again attempted, proved futile, and suprapubic puncture, with subsequent drainage, was resorted to and continued for five days, when the prostate was removed. Hiccough, four days after operation, with slight rise of temperature and cloudy mental condition.

On January 27th double decapsulation of the kidneys for suspected uremia. While in narcosis phlegmon of the prevesical space, running into the right fossa iliaca, was detected and evacuated. Death, January 29th.

Case III. *Suprapubic prostatectomy; cure.*—M. P., 59 years old, enters the hospital with acute retention, which suddenly came on three weeks ago. Permanent catheter for eleven days. On January 20th removal of prostate. First urination February 4th. Discharged February 14th with perfect functional result, viz.: he urinates 300 c.cm. of clear urine at the time without any residual urine. Sexual power preserved.

Case IV.—*Suprapubic prostatectomy; cure.*—M. W., 65 years old, enters with incomplete chronic retention; amount of residual urine, 1,700 ccm. Catheterization before admission. Permanent catheter for ten days. On February 17, 1905, removal of small median lobe only. First urination on March 5th, discharged cured on March 20th, with a residual urine of 15 ccm. At a subsequent examination, one year later, he passes 410 ccm. of 450 ccm., ejected liquid in a good stream; he states that he urinates every three hours during the day, once at night, and that his sexual power is much better than before the operation.

Case V.—*Suprapubic prostatectomy; death from uremia.*—L. S., 60 years old, enters with acute retention of two weeks' duration. Bladder distended up to umbilicus; false passages. Permanent catheter for six days. Operation on March 10, 1905. Death on March 13th.

Case VI.—*Suprapubic prostatectomy; death.*—A. P., 65 years old, admitted on April 14, 1905, after unsuccessful attempts of catheterization. Upon admission 1,500 ccm. of bloody urine were withdrawn by suprapubic puncture. On April 15th, removal of a large prostate without difficulty, but with profuse bleeding, which was controlled by packing. The urine remained bloody—notwithstanding there being no hemorrhage from the bladder—until the patient died, on April 25th, without symptoms of sepsis or uremia.

Case VII.—*Suprapubic prostatectomy; cure.*—A. B., 69 years old, has been leading a catheter life for three weeks before admission. Re-

moval of prostate in one piece on April 14, 1905. First urination, 360 c.cm. at one time, on April 30th. Discharged on May 10th perfectly cured and has remained so, when seen again one year after operation.

Case VIII.—*Subrapubic prostatectomy; cure.*—N. B., 63 years old, admitted May 9, 1905, with frequent and painful micturition, day and night, for one year. Removal of cystic degenerated prostate (cysts diagnosticated before admission through cystoscopy) on May 12th. Double epididymitis three weeks after operation. Discharged cured on June 20, 1905.

Case IX.—*Suprapubic prostatectomy; death from pneumonia.*—S. S., 78 years old, was admitted on June 6, 1905, with the fifth attack of acute retention, general weakness and loss of weight. Twelve hundred ccm. of bloody urine were evacuated. Since catheterization was difficult and caused a severe hemorrhage, suprapubic cystotomy was performed under local anesthesia. Three days later a large prostate was removed. The condition of the patient was fair from June 10th until June 29th; temperature normal; the suprapubic wound showed, however, very little tendency to granulate. The pulse became rather feeble and a dulness was found at the right base with rales over both lobes. The patient died on July 6th, four weeks after operation.

Case X.—*Suprapubic prostatectomy; death.*—L. M., 75 years old, entered the hospital on June 27, 1905, with the history of an acute retention of thirty-six hours' duration, with a profuse bleeding from the urethra, false passages and a temperature of 101° F., due to instrumentation before admission. The patient, a very stout man, was breathing with difficulty and the breath had a foul odor. A suprapubic cystotomy was performed and about 600 ccm. of foul-smelling blood and clots were removed. The following day the temperature went up to 101.6° F. The tongue was dry and the patient cyanotic. On June 30th the bladder wound was gangrenous and the temperature 102.5 F. A rapid enucleation of the prostate was made and was followed a few hours afterward by profuse bleeding, due to repeated attempts of the highly-excited patient to get out of bed. The bladder was packed. The patient died the following morning.

Case XI.—*Perineal prostatectomy; cure.*—A. D., 75 years old, acute retention, following long standing prostatic trouble. On July 28, 1905, perineal prostatectomy. On August 3d, on changing the dressing, a rectal fistula found, on August 15th sudden attack of edema of the lungs, from which he recovered. Discharged with small perineal fistula on October 3d. Six months after the operation he urinates with ease every two hours during the day and every three hours at night; perineal fistula still present; at times a few drops of

urine, but no fecal matter, discharged through fistula. Capacity of the bladder, 300 ccm., residual urine 15 ccm.

Case XII.—*Suprapubic prostatectomy; cure.*—E. T., 73 years old, painful and frequent micturition for three months. On July 28, 1905, removal of prostate and of several stones of the bladder. The patient had for forty-eight hours intense hiccough and great weakness. The hiccough lasted in diminished intensity until August 14th. The local condition was very satisfactory, but the patient was very much depressed and refused to eat, suffering from nostalgia. He was discharged on August 29th, and rapidly recovered, when at home; perfectly cured.

Case XIII.—*Suprapubic prostatectomy; cure.*—S. R., 65 years old, twice operated for stone in the bladder eight and three years ago. Urinary symptoms for one and one-half years, urinates eight to nine times at night. Permanent catheter and irrigation of bladder for three weeks. On September 8, 1905, a very large prostate was taken out, seventeen days later the patient urinated entirely per urethram. Discharged cured September 28th.

Case XIV.—*Suprapubic prostatectomy; cure.*—A. F., 60 years old, admitted with retention of eleven days' duration. Frequent urination for fifteen years. Operation on October 13, 1905; discharged cured November 18th. He was seen again and it was found that his sexual power was unimpaired. He urinates every three to four hours. No residual urine.

Case XV.—*Suprapubic prostatectomy; cure.*—B. H., 64 years old, difficult and frequent urination for several years, sudden attack of retention two weeks before admission; had been treated at another hospital for nine days and discharged as incurable (patient's statement). Prostate was removed on December 22, 1905. The recovery was retarded by persistent suprapubic fistula, which finally closed. Discharged on March 6, 1906, very much improved in general health, and with good function of the bladder. Urine still cloudy and urination more frequent.

Case XVI.—*Suprapubic prostatectomy; cure. Readmission for relapse; probably carcinoma.*—M. L., 77 years old, acute retention of two weeks' duration; permanent catheter for one week. Preliminary cystotomy under local anesthesia. Prostatectomy on February 9, 1906. Suprapubic fistula persisted for over two months. Discharged April 15th, fistula closed. For the next six months he was in good general condition and free from urinary symptoms. He then began to lose in weight and strength and re-entered the hospital with hematuria, reduction in weight of twenty pounds, and severe pain in

sacral region and along sciatic nerve. Per rectum a hard, nodular mass was felt, occupying the prostatic space. The case was considered inoperable and the patient discharged unimproved. The pathological report of the removed prostate had been "adenoma."

CASE XVII.—*Supapubic prostatectomy; cure.*—L .W., 62 years old, acute retention two and one-half years ago, for which he was catheterized for six months. Since then he has gradually increasing frequency of urination until, at present, he has to urinate every ten minutes, day and night. Residual urine 840 ccm. He has lost in weight and is in a poor general condition. After a preliminary cystotomy, a very large prostate is removed on February 23, 1906. On March 12th he passes with an excellent stream 180 ccm. of urine. March 16th discharged, easy urination, no residual urine.

CASE XVIII.—*Suprapubic prostatectomy; cure.*—A. S., 74 years old, has had frequent urination for two years, which has steadily grown worse. At present he urinates with pain eight to ten times during the day, five to six times at night. During the past year he had intermittent hematuria. The prostate was removed on April 13, 1906, and the patient discharged cured on May 15, 1906.

CASE XIX.—*Suprapubic prostatectomy; cure.*—W. F., 75 years old, has had urinary difficulty for the last twenty years. During the past few months the tenesmus has increased and he passes very little urine, without the use of a catheter. The prostate was removed on May 19, 1906. The patient made an uneventful recovery, except for a urethral chill on June 5th, when the temperature rose to 103°, but came down within twenty-four hours. He was discharged cured on June 11, 1906.

CASE XX.—*Suprapubic prostatectomy; cure.*—M. S., 60 years old, was suddenly, two weeks ago, attacked with violent pain in perineum, hypogastrium and iliac region, accompanied by chills, fever and retention. His physician catheterized him twice daily until the day of admission, when another attack of acute retention, chills and fever set in. The bladder had to be aspirated. For the next six days permanent catheter and irrigation were employed, without relief. The prostate was removed on May 25, 1906, and the patient discharged cured on June 21st, urine still slightly cloudy, but no residual urine.

CASE XXI.—*Suprapubic prostatectomy; cure; followed by stricture of urethra.*—B. B., 65 years, enters the hospital with acute retention. The prostate, of the size of a hen's egg, was removed on May 25, 1906. On June 8th, after having removed the tube, an attempt was made to irrigate the bladder without a catheter, but the liquid failed to enter, likewise a soft and a woven catheter. A sound 22 F. passed an ob-

stacle in the posterior urethra. Sounding was kept up, up to 28 F., when the patient developed an epididymitis. He left the hospital with normal urination, on July 13th, and was well for five weeks, when he began to have pain and difficulty in urination. He re-entered the hospital on September 1, 1906, urinating every half-hour in a thin stream and with difficulty. An obstruction was met in the prostatic urethra, a fourteen Mercier catheter introduced and left in situ. The stricture was dilated with sounds and the patient discharged cured, after a cystoscopy showed a normal condition of the bladder, with the instruction to keep up the passage of sounds.

Case XXII.—*Suprapubic prostatectomy; cure.*—T. W., 53 years old, enters the hospital with acute retention of two weeks' duration. A small prostate was removed on June 15, 1906. On July 9th the patient passes a pint of urine with slight effort in starting the stream. Discharged cured July 10th; no residual urine.

Case XXIII.—*Suprapubic prostatectomy; cure.*—M. D., 75 years old, had entered the hospital on January 21, 1906, on account of painful and frequent micturition of six months' duration. Cystoscopic examination showed enlargement of both lateral lobes and a median lobe. He improved under conservative treatment and was discharged on February 8th, but readmitted on June 21, 1906, on account of exacerbation of his urinary symptoms. On June 22, 1906, the entire prostate was removed in one piece, together with part of the urethra. First urination on July 9th. The patient left the hospital, the urine still slightly cloudy, after an attack of epididymitis on August 2d, cured.

Case XXIV.—*Suprapubic prostatectomy; cure.*—S. P., 63 years old, enters the hospital on July 3, 1906, with acute retention, edema of the legs, headache, loss of appetite and bloody urine. He is very stout and has a systolic murmur at the apex. Catheterization having caused a false passage with profuse bleeding, suprapubic puncture was made with a large trocar and a catheter introduced through the trocar and left in situ for five days. On July 13th suprapubic cystotomy, and on July 20th prostatectomy were performed. On August 16th the patient passes 240 ccm. of urine two or three times daily; there is, however, still some leakage through suprapubic wound. The latter is closed on September 1st, and the patient discharged, cured, on September 3d. Subsequent report: Sexual power preserved, urination absolutely normal; no residual urine.

Case XXV.—*Suprapubic prostatectomy; cure.*—L. L., 70 years old, admitted on August 8, 1906, for retention, for which he had been catheterized; great tenderness in both lumbar regions. Permanent catheter for nine days. On August 17th removal of prostate. Condi-

tion poor, pulse irregular, color waxy for one month following the operation. Temperature, running up at times to 102°. Catheterized urine and blood cultures show bacillus coli. He recovered, however, and was discharged on October 25th with easy urination, without any residual urine, but with slight edema of the legs.

CASE XXVI.—*Perineal prostatectomy; cure; followed by stricture; cure.*—S. G., 70 years old. Acute incomplete retention for one week. A moderate-sized prostate was removed in three pieces on August 24, 1906, five days after admission. On September 18th, the wound in perineum is closed, patient urinates with good force; no residual urine; no incontinence. He is discharged on September 19th, after having been sounded several times and returns for inspection, at our suggestion, on October 23d, stating that he has no difficulty in urinating. In introducing a catheter to determine, if there is any residual urine, a stricture was found in the prostatic urethra. He was readmitted for dilatation and discharged cured on October 31st.

CASE XXVII.—*Perineal prostatectomy; cure. Perineal fistula; abscess of testicle; carcinoma of prostate (?).*—A. G., 70 years old, has had an attack of retention one and one-half years ago, for which he was catheterized. Attack of retention when admitted. On September 14, 1906, the prostate was removed. On September 21st he voids some urine per urethram and can hold 240 ccm. in his bladder without leakage. On September 24th he urinates entirely through the urethra and has no residual urine. He then developed a double epididymitis, which slowly subsided, and was discharged on October 19th with thickening of both epididymes. He voids 270 ccm. of urine in a good stream and has no residual urine. He re-entered the hospital on November 4th, stating that soon after his discharge the left testicle became painful and enlarged, and that the perineal wound had opened, a few drops of urine escaping through the opening. A fistulous opening was found, with its outer opening in the middle of the perineum, the inner one about one and one-half inches above the anal margin. This fistula and the testicular abscess were opened and drained, and the patient discharged, cured, on November 27th. He presented himself again in February, 1907, and while there is no disturbance in urination and the fistula is closed, he looks cachectic, and has lost considerable weight. A hard mass, very suggestive of carcinoma of the prostate, is to be felt in the rectum. Microscopical report of the prostate, removed on September 14, 1906, "Adenoma."

CASE XXVIII.—*Suprapubic prostatectomy; cure.*—I. H., 72 years old, prostate symptoms for twenty years, admitted with retention on October 1, 1906. The prostate was removed on October 5th, and the patient discharged cured on November 20th, great improvement in general health, patient had myocarditis—excellent functional result.

Case XXIX.—*Suprapubic prostatectomy; cure.*—F. A., 48 years old, difficult urination with attacks of retention for three and one-half years; states that he was treated for diabetes insipidus. Admitted for retention on October 17, 1906, with retention, 900 ccm. of clean, very light urine withdrawn. Daily amount of urine, 3,000 ccm. Examination by neurologist (Dr. B. Sachs), negative. Conservative treatment without effect. On October 27th the prostate, of the size of an apple, is removed. Discharged on November 22d, cured, normal, easy urination. At a subsequent examination it was found that his sexual power was not impaired and that he empties his bladder at normal intervals without any residual urine. No signs of diabetes insipidus.

CONTRIBUTIONS FROM THE PATHOLOGICAL DEPARTMENT.

THE PATHOLOGY OF NEW GROWTHS OF THE BLADDER.*

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This paper is based chiefly on the observation and study of specimens referred for diagnosis to the Pathological Department of the Mount Sinai Hospital during the past nine years, and embraces 29 cases of primary tumor of the bladder, and eight secondary tumors. Among these 37 cases are two, inoperable in nature, in which the specimens were obtained at autopsy. The remaining 35 cases were operated upon by the Attending Staff, to whom I beg to extend my thanks for their courtesy in furnishing me with the necessary clinical data. The hospital records show quite a number of additional cases not operated upon, but I have made use only of those in which a microscopical study of the specimen was made.

The most satisfactory classification of these tumors is one which places them in groups according to the tissue from which they have their origin, or of which they are composed. Accordingly, we have for consideration, (1) An epithelial tissue group, in which are placed papilloma, adenoma, carcinoma and cysts. (2) A connective tissue group, comprising fibroma, myxoma and sarcoma. (3) A muscle tissue group, in which are placed the myomata. Besides these, Albarran suggests a group of heterotopic forms, such as chondroma, rhabdomyoma and dermoid, in which the tumor does not originate from normal elements of the bladder wall. In all of these groups sub-varieties occur, when more than one type of tissue is involved in the formation of the tumor, as for example, adeno-carcinoma, myo- or myxo-sarcoma, and the like.

Before describing in detail the pathological anatomy and histology

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of the more common forms of tumor, a few words as to their frequency, malignant nature, and etiology may not be out of place. Statistics show that primary bladder tumors, irregardless of their histological structure, comprise about 0.7% of all tumors. The older statistics prove that the cases are quite evenly divided between males and females, but in recent years the percentage has changed in a marked degree, due, no doubt, to improved and modern diagnostic methods of examination of the bladder in the male. The statistics of to-day show that only 9.8% occur in females. This figure gives a variation of less than one per cent. in four separate series numbering 560 cases. A similar error also occurred in the older statistics regarding the question of malignancy. Those writers who considered all papillomatous growths as benign, naturally called attention to the greater prevalence of such tumors, while others, who regarded this type as malignant, had opposite views. Only since a more careful microscopic examination has been the rule, have reliable data on this point been obtained. Leaving out of consideration the more unusual forms of malignant tumors and taking only the carcinomata as a type, Albarran found 66 malignant cases in his series numbering 88, or 75%; Zuckerkandl had 21 in 32 cases, or 65%, and I found 19 in 29 cases, or 65%, showing beyond question the large percentage of malignant growths. As a rule malignant bladder tumors remain more or less localized for a comparatively long period and only in the later stages do metastases develop in other organs. The lymph nodes, however, may be involved somewhat earlier, notably the pelvic, retroperitoneal, inguinal, or lumbar nodes. Extension of the tumor by direct growth to adjacent organs is not the rule, though this may happen.

Regarding the age at which bladder tumors arise, it may be said that carcinoma, as a rule, is found between the ages of 50 and 60, while sarcoma occurs more frequently in younger subjects, and certain types even in childhood. Many variations from the ages mentioned may be found, as for instance a case of carcinoma in my series at the age of 25, and a case of sarcoma reported by Kroph[1] in a woman 62 years of age. The benign tumors may arise at any period. Those in my series occurred between the ages of 18 and 58 years, respectively. As to the question of etiology, but little can

be said, although chronic irritation seems to be an important factor in some cases. Calculi, cystitis, the distoma hematobium, the irritant effects on the bladder in the manufacture of aniline dyes, as well as psorosperms, have all been noted as being of etiological significance.

Secondary tumors are those arising in neighboring or adjacent organs and growing into the bladder by direct extension. The recognition of their secondary character is of great surgical and prognostic importance as will be shown later. These tumors frequently originate in the prostate, uterus, vagina, or intestine. Metastatic bladder tumors are of the greatest rarity and do not come within the scope of this paper.

The first tumor of the epithelial tissue type to be described is the papilloma. A better name for this tumor, one defining its histological structure more accurately, is fibro-epithelioma, inasmuch as both of these tissues are involved in its production, or, better still, papillary fibro-epithelioma. German writers use this term quite uniformly, but the word "epithelioma," from its common application to superficial or malignant growths elsewhere, may prove misleading, from a clinical standpoint, to those unfamiliar with the term. A papilloma may occur single or multiple in number and may arise from any portion of the bladder wall. The typical form consists of a stem or pedicle from one or two, to six or eight, millimeters in diameter, springing directly from the mucosa, and from a few millimeters to several centimeters in length. Many tufts or villi spring from the pedicle, giving a shaggy appearance to the growth. This is particularly noticeable when the tumor is floated in water or as viewed with the cystoscope. In the air the villi often collapse, and the whole growth may present a soft, greyish-colored mass, without distinguishing features. The villi usually bifurcate into innumerable branches, closely resembling one another but varying somewhat in length. When the villi are uniformly short and plump the tumor has a cauliflower-like appearance. At times a spot is seen on the surface devoid of villi, or an area of ulceration or hemorrhage may be noted. Occasionally a crystalline deposit of phosphates may form superficially. The pedicle, as already mentioned, arises directly from the mucosa and does not infiltrate the deeper parts. For this reason, when gentle traction is made, the mucosa may be lifted from its

normal position. When the tumor springs from the trigone this may not occur, as in this situation the mucosa is normally in close relationship to the subjacent tissues. Not all papillomata are pedunculated, and the sessile form with a more or less extensive base is not uncommon. In such forms the villi may be short and project but slightly above the surface. At times this type is nodular and may contain more fibrous connective tissue than the ordinary villous form. It is then frequently called fibro papilloma. In size, a papilloma may range from a small tumor of a few millimeters in diameter to one nearly filling the bladder. As in all other tumors of this organ, the growth may interfere mechanically with the normal bladder functions so that urination may be disturbed or hydronephrosis be produced, depending upon its situation.

Microscopically, the pedicle is composed of connective tissue, unstriped muscle fibres, elastic fibres, blood vessels and nerves, its surface being continuous with the epithelium of the mucosa. A few muscle fibres may extend into the roots of the villi. In the villous portion of the tumor, the epithelial elements as well as the connective tissue fibres combine to form the bulk of the growth. Each villus contains a central core of loose connective tissue, and a blood vessel with delicate walls, which, at the tip of the villus, forms a distinct capillary loop. Surrounding this central portion are several layers of epithelial cells. The inner layer consists of cylindrical cells radially placed. Above this are many layers of large, irregularly shaped polygonal cells, while the surface layer consists of somewhat flatter cells parallel to the long axis of the villus. (Fig. 1). This outer layer is often destroyed or absent and as a rule it can be seen only between adjacent villi where mechanical injuries are less frequent. The lower layers of epithelium may also be destroyed, by injuries, inflammation, or even by physiological trauma, giving rise to hemorrhage. At times there seems to be a tendency for several adjacent villi to adhere to each other, but this does not take place unless the surface epithelium is desquamated. (Fig. 2.) Occasionally small fragments of villi are broken off and may appear in the voided urine. I have had the opportunity of examining material of this nature. In one instance the tissue was perfectly preserved, in two other cases it was necrotic and covered with crystalline deposits.

Interference with the circulation, from bending or twisting of the villi, may give rise to marked congestion in the central zone, or to edema of this portion. In one case of a male aged 41 years with a papilloma near the trigone, having a pedicle 3 cm. in length, the cystoscope showed villi of a distinctly transparent character. The sections from this growth gave a somewhat cystic appearance near and just beneath the surface. The superficial epithelial cells were all more or less dropsical or edematous and of large size. All of the cyst-like spaces that were found lined with cells of this type contained a finely granular, almost homogeneous substance. (Fig. 3). While this condition may be due entirely to edematous changes, I am inclined to believe that it is similar to a case described by Zuckerkandl,[2] with the production of cysts containing colloid material. Nothing in the history of this case points to a cystitis, nor was there any evidence of a cystitis cystica. Sections of many of the papillomata do not present the typical, long, villous processes described, for many of the denser forms show a fusion of the villi into one compact mass. Such sections appear almost wholly epithelial in nature, with here and there a cross or longitudinal section of the central core. (Fig. 4).

Although papillomata are found frequently in cases with no previous history of inflammation, this condition may supervene and the tumor then be involved in the inflammatory process. The frequent absence of previous inflammation, together with the fact that these tumors are so often multiple, has led Ribbert[3] to surmise that they arise from some embryological defects in the bladder wall. In some cases of chronic cystitis, notably the papillary and cystic varieties, there may be a tendency at some point for a marked proliferation of the process. This may give a papillomatous appearance to the bladder at such a site, but the absence of typical villi and the presence of cysts and inflammation together with the large number of newly-formed blood vessels in the submucosa, will assist in the diagnosis. The tendency for papilloma to recur after its removal is a well established fact. The growth frequently reappears as a simple benign tumor, though in some instances it may be distinctly malignant in character. At times several apparently benign papillomata may be found, one of which may prove to be malignant. This fact, however, may not be known until a microscopic examina-

tion is made, for the two forms closely resemble each other macroscopically, as will be described later.

A most important question now arises. Can a simple, benign papilloma become carcinomatous? While Borst, Lubarsch, and a few other authors deny the possibility, the weight of opinion to-day is confirmative, and Ziegler, Orth, Birch-Hirschfeld, Kürsteiner and Zuckerkandl have described cases which seem beyond doubt to bear out their views. A papilloma which has undergone such a malignant change may not on gross inspection present any unusual appearance, but the histological examination shows important changes. The epithelium loses its typical arrangement and uniform shape, and shows a tendency to proliferate into the stroma. These changes may not affect the entire tumor, and here and there a villus of normal appearance is seen. The process begins usually in the deep epithelial layer, and soon the definite relationship between stroma and epithelium is lost. The villi, later on, fuse together, and finally in some parts of the tumor all the characteristic appearances of a papilloma may disappear, leaving only a mass of atypical epithelial cells without definite arrangement. Eventually the process extends to the deeper parts and involves the bladder wall. In other cases, the carcinomatous process begins as such in the deep parts, while the papillary portion of the tumor may remain benign, histologically, for a considerable length of time. In one of my cases, the changes in the epithelium from simple papilloma to carcinoma are most striking and the transition can be clearly followed. (Fig. 5). The tumor occurred in a male 68 years and was a pedunculated papilloma with symptoms of one year's standing. The operation is of very recent date and therefore it is impossible to give any further history regarding the question of recurrence. Other clinical observations in corroboration of this question have been made, such as the presence of a benign papilloma side by side with a carcinomatous papilloma; and one case has been recorded of hemorrhages for twenty years, after which time a carcinomatous papilloma was removed. From our knowledge of malignant growths, this could hardly have been a case of carcinoma from the beginning. The statistics of several carefully examined series show that the simple papilloma forms about 20% of the cases of primary bladder tumors.

The next tumor to be described is the papillary carcinoma. From what has previously been stated, it will be seen that this type of tumor is not always to be recognized on gross inspection. In appearance it may resemble the simple papilloma so closely that a microscopic examination alone can decide. It has been claimed that no papilloma should be pronounced carcinomatous unless both pedicle and the bladder wall are infiltrated. This statement is true in many instances and from a clinical standpoint is of value, for when the pedicle is tightly bound down to the thickened bladder wall and when the mucosa cannot be lifted off by gentle traction, the diagnosis of carcinoma, as a rule, is fairly established. But the statement has its limitations especially in those cases where the carcinomatous changes have just begun and are still confined to the superficial portions. From what has been said it must not be understood that all papillary carcinomata arise from the simple papillomata, for many of them are malignant from the first. In my series this variety of tumor occurred in 16 of the cases, or 57% of all the primary growths. All of the cases were in males and the ages ranged from 25 to 82 years, respectively, the average being 52 years. In 11 cases the bladder wall was infiltrated, occasionally by small epithelial nests, at other times by a dense growth. In three cases no involvement had occurred; in two cases it was impossible to determine this point. After removal this form of tumor may recur, not necessarily as a papillary growth, but frequently as single or multiple nodular tumors, or as an infiltration, with or without any villous formation. Ulceration and hemorrhage are not infrequent. As far as its location is concerned, a papillary carcinoma may arise from any portion of the bladder. Histologically the picture of carcinoma in well advanced cases is typical. In earlier stages, the epithelial cells lose the typical arrangement as seen in papilloma and are polymorphous in character, the nuclei become larger and more irregular, and atypical proliferation occurs, and finally the infiltration of the stroma takes place. (Fig. 6). Perforation of the bladder wall is very rare, and metastases occur only in the late stages.

The non-papillary forms of carcinoma are somewhat less frequent. The cauliflower type is occasionally met, also the infiltrating forms.

The latter rarely produces any distinct tumor formation. A simple carcinomatous ulcer is likewise seen at times.

The flat or squamous celled carcinoma may also be found in the bladder, though it is somewhat infrequent. In my series it occurred in only two cases, both in males. Squamous celled epithelium is not found normally in the bladder but may be present as a result of metaplastic changes, due to some form of chronic inflammation. In such an event a carcinoma may arise from the metaplastic epithelium. This type of tumor is hard as a rule, but a soft form is also described. A tendency to infiltrate the wall is present, and ulceration quite common. In one case quite a large, solid piece of tumor tissue was washed from the bladder, from which a diagnosis could be made. (Fig. 7). Epithelial pearls may be found, also cells with keratohyalin granules but these do not occur with the same frequency as in tumors of this variety in other situations.

Stoerk[4] has described a tumor in which both squamous cells and cylindrical cells were found side by side in the deep parts. In one of my cases this same condition occurred, but I have grouped this case with the papillary carcinomata, which it resembled in every other respect. Only a few squamous cells were present, the greater part of the neoplasm being of the cylindrical cell type.

Fibro-carcinoma or scirrhus carcinoma also occurs in the bladder. (Fig. 8). My series shows five cases of this kind, all in males, with the ages ranging from 52 to 65 years. In every instance the bladder wall was infiltrated and all of the cases terminated fatally.

The tumors were hard and dense in structure and were situated mostly at the region of the trigone and extending along the posterior wall. In one of the cases the tumor was somewhat friable and hemorrhagic. In another instance the inguinal lymph nodes were the seat of a metastatic growth, and in a third case the retroperitoneal lymph nodes were found involved at the autopsy. A medullary type, rich in cells, with relatively scant stroma was observed in one of the cases. (Fig. 9).

In the study of these five cases an observation, which to my mind is of great importance, was noted. These cases were all examined carefully before operation, they were diagnosed as new growths of the bladder and as such were operated upon. But

a close study of all of the extirpated tumors, and a post mortem examination in two of the cases, revealed the fact that four of these tumors were primary growths of the prostate, with a secondary involvement of the bladder. In the remaining case, although the prostate seemed to be quite large and on gross examination presented a hard nodular tumor, this proved to be a fibroma on microscopic examination, and the prostate was not involved. Therefore, as a result of my findings I am compelled to place four of these five cases in the class with the secondary tumors.

A similar observation was made in studying two cases of adeno-carcinoma, both of which occurred in males, ages 48 and 67 years respectively. Both cases ended fatally and in each instance it was found that the prostate was primarily affected. (Fig. 10.) For many years it was believed that the bladder mucosa was devoid of all glandular structure, and even to-day many text-books make this statement. In those cases where a primary adeno-carcinoma was found, its occurrence was explained on the theory that the aberrant glands from the prostate, which, as is known, may be situated in the bladder mucosa, served as the point of origin of the tumor. This theory, however, is not essential at present, nor would it explain the presence of typical adeno-carcinoma in the female. The fact that glands may and do occur has been established. Von Limbeck[5] and von Brunn[6] have described small epithelial buds or processes dipping downwards into the mucosa and forming small rudimentary gland-like structures. These may occur at any age, even in childhood, and do not exist at the trigone alone, but may be found throughout the upper urinary tract. These observations have been confirmed by Aschoff, Lehndorf, Stoerk and others. From these rudimentary glands, therefore, an adeno-carcinoma may have its origin, and Stoerk and Zuckerkandl[7] have published several cases of this type within the past month. In a case of cystitis cystica with marked epithelial proliferation I have seen glands of this nature lined with cylindrical epithelium, some of which were situated below the surface while others were still connected with the surface. A similar observation was made in the mucosa covering a simple myxomatous polyp, and in both cases these structures were typical glands from a histological standpoint.

Simple adenoma as well as fibro-adenoma are quite rare in the bladder. Two cases of the latter variety, forming distinct vesical growths were also found to be primary tumors of the prostate. Colloid carcinoma may exist in the bladder but is not common. The glands of Limbeck and Brunn are believed to have an important bearing on the production of colloid carcinoma, for these glands are frequently the seat of epithelial degeneration and they may then appear as small cysts containing colloid material, from which a carcinoma may arise. In any of the above types of carcinoma a villus growth may be found on the surface, therefore it is important always to carefully examine the deeper portions for a correct diagnosis.

From what has been said regarding the scirrhus and the adenomatous forms of carcinoma, together with the high mortality, I am led to regard them as particularly malignant epithelial tumors and would call attention to the importance that the prostate may have in their production.

Cysts, other than those arising from the Limbeck-Brunn glands, may be found as a result of congenital defects connected with the urachus, the Wolffian body, or Gärtner's duct. Cysts of this kind are not common.

The connective tissue tumors are less frequent than those just described and the common forms only will be considered. Fibroma is not often met and but few cases have been reported. The favorite site is at the base of the bladder, and it is described as a hard growth, often pedunculated, and containing fibrous connective tissue and muscle fibres. It always lies beneath the mucosa which appears to be stretched over the tumor and not adherent to it. Myxoma is not so rare a form and occurs most often in childhood. It may be found as a simple, pedunculated, polypoid growth, or as multiple, rapidly growing nodules, having a marked tendency to recurrence after removal. This tumor resembles grossly the common nasal polyp, but it is somewhat denser in consistency. Histologically it is composed of branching cells and mucous tissue, and is very vascular as a rule. (Fig. 11.) The surface is usually covered with normal mucosa. In one case I found a few muscle fibres in the deep portion, evidently near its attachment. Its favorite site seems to be at or near the urethral opening, and in the two cases in my series it was discovered

at this situation. One case was in a male child two years of age and the other in a female of three years. In the latter case the tumor mass protruded from the urethra and recurred several times after removal. Each microscopic examination showed simple myxomatous tissue. The final specimen which was removed by a supra pubic operation five months later was found to be a myxosarcoma of a round and spindle cell type. (Fig. 12.) The entire bladder was filled with nodular tumor masses and the child died several weeks later. An interesting feature of this case was the presence of metaplastic squamous celled epithelium upon the surface of the last specimen obtained. Although this case may have been a myxosarcoma from the beginning, there were no evidences of such a condition from the portions removed at the earlier operations, and it is possible that malignant changes developed subsequently. Another case of myxosarcoma occurred in a female aged 22 years, in which the tumor extended through the bladder wall and infiltrated the recti muscles, but it was impossible in this case to discover the exact origin of the growth.

Other forms of sarcoma may be found in the bladder, but as a rule they do not have any definite or uniform features. Such tumors may be single or multiple in number, hard or soft in consistency. They are sessile as a rule but a pedunculated variety has been described. The surface is smooth or nodular and usually covered by mucosa unless ulceration is present. An infiltrating form also occurs, frequently involving the entire thickness of the bladder wall. One case of this kind of a rare histological type was observed recently in a man 56 years of age, who gave a history of repeated hemorrhages for one year and who was distinctly cachectic. The tumor was very extensive, infiltrating the left lateral and inferior walls, and presenting a partially necrotic and hemorrhagic surface. There was no apparent involvement of the prostate. The microscopic examination revealed an endothelial sarcoma, inflamed in parts, and growing upwards to the mucosa. A simple papillomatous tumor arose from the mucosa at this situation. The extent of the sarcoma is very sharply defined at this site, and although the tumor grows actively in the fibrous stroma of the papilloma, in no place are the epithelial cells of the papilloma disturbed or involved by the malignant growth. (Fig. 13.) It is interesting to note that about 30 per cent. of the re-

ported cases of sarcoma have been found in females. Many mixed types have been reported, such as chondro-sarcoma, fibro-myo-enchondroma, fibro-rhabdomyoma, but these are unique, and are simply mentioned.

Myoma of the bladder is not common. It arises directly from the muscle fibres and may be single or multiple. There is nothing characteristic in its gross appearance, but as a rule it is covered by normal mucosa and is nodular in form. This tumor is regularly of the unstriped muscle variety, but rhabdomyoma also has been reported. Only one case of dermoid of the bladder is known; that described by Thompson.

Secondary tumors cannot be classified with satisfaction on account of the various sources of origin. They are frequently accompanied by inflammatory changes or necrosis. The importance of tumors arising in the prostate and growing into the bladder has been mentioned. Besides those already described, my series contains a case of lympho sarcoma with the primary growth in the appendix, and a case of round celled sarcoma of prostatic origin in which the bladder wall was infiltrated and measured 2 to 4 cm. in thickness.

NOTE.—Since the above paper was written, an autopsy was performed on the case of endothelial sarcoma and several smaller tumors were found in the bladder wall, many of which extended but slightly above the surface of the mucosa. From the left wall of the bladder a large tumor mass extended to the bony pelvis, to which it was adherent. Extensive metastases were found in both kidneys, in the lungs and under the visceral pleura, and a few on the surface of the liver. One small metastasis was present in the right lobe of the prostate, which also contained a small abscess. Microscopically, the various metastases presented the same general structure as the primary growth in the bladder.

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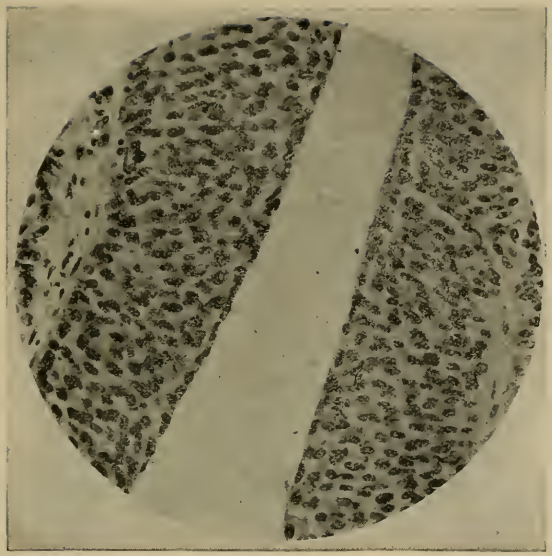

Fig. 1. Papilloma of bladder, showing intact surface epithelium parallel to long axis of villus. × 250.

Fig. 2. Papilloma, showing fusion of two villi on the right, due to loss of surface epithelium. × 50.

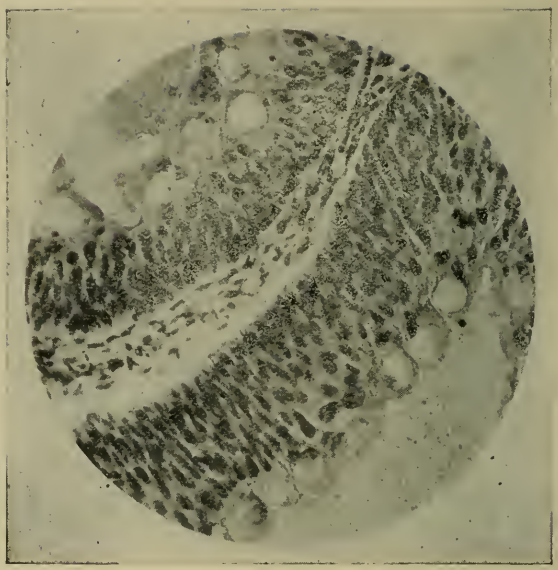

Fig. 3. Papilloma with cyst formation, edema of superficial epithelium, and colloid (?) degeneration. × 250.

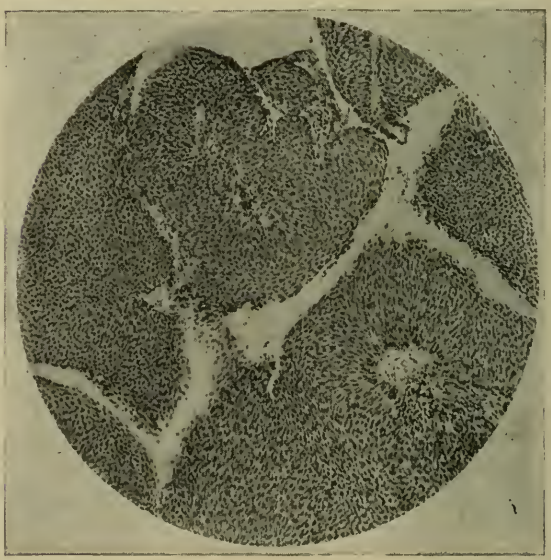

Fig. 4. Papilloma showing general fusion of villi, with cross and longitudinal sections of central zones. × 50.

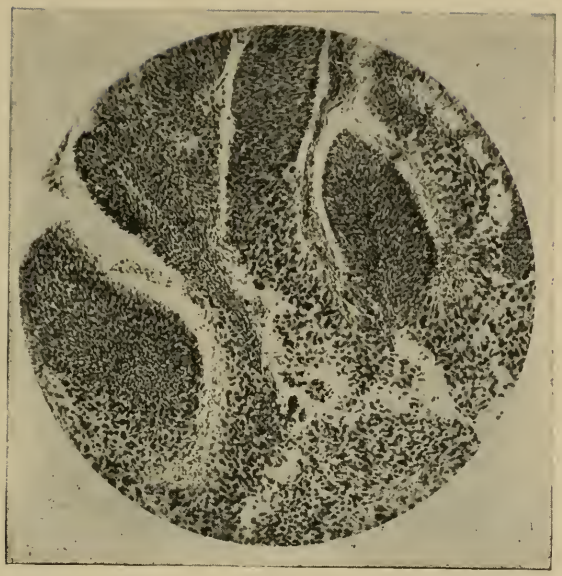

Fig. 5. Papilloma with beginning carcinoma, showing its origin in the deep epithelial layers. × 50.

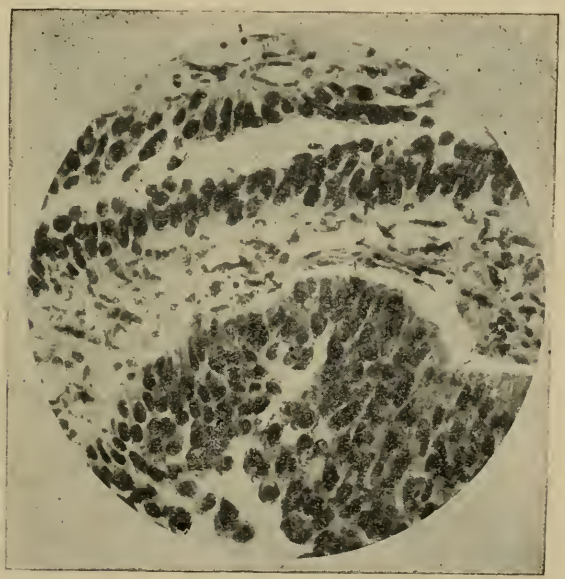

Fig. 6. Papillary carcinoma, showing atypical proliferation of epithelial cells. × 250.

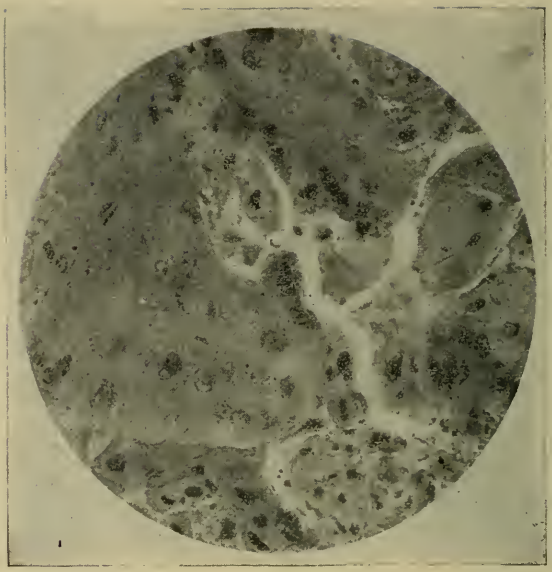

Fig. 7. Section of squamous celled carcinoma of the bladder. × 250.

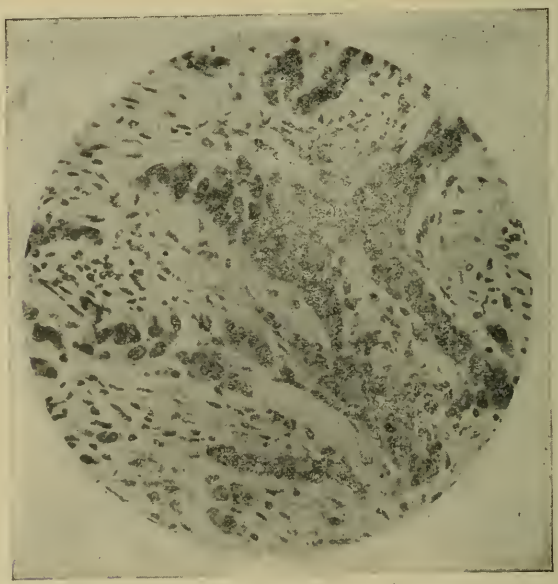

Fig. 8. Fibro carcinoma (scirrhus) with primary tumor in the prostate. × 250.

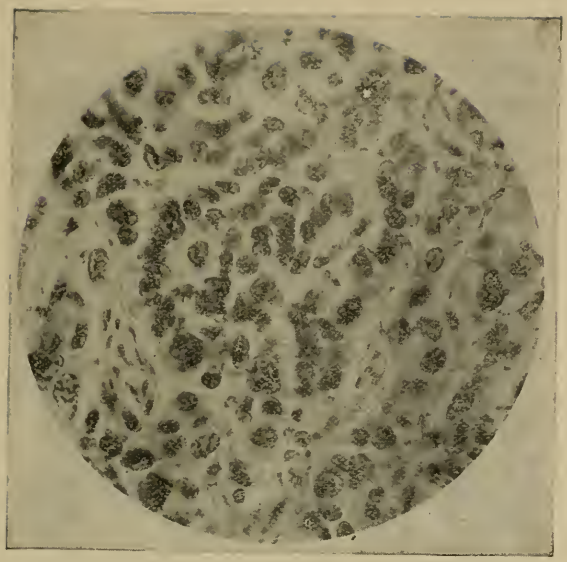

Fig. 9. Fibro-carcinoma (scirrhus) of medullary type. × 250.

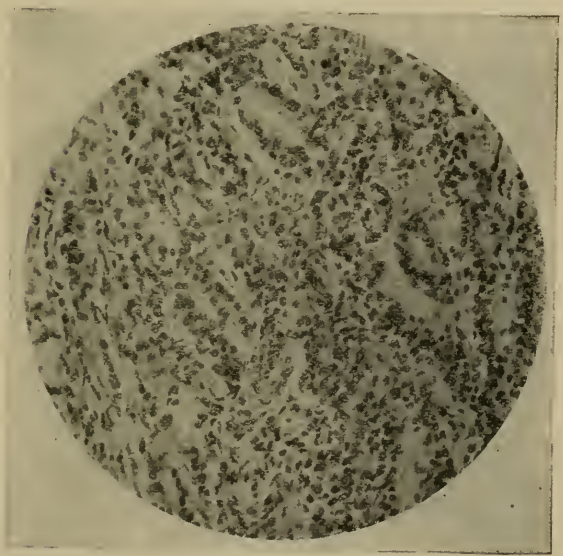

Fig. 10. Adeno carcinoma of the bladder, with primary tumor in the prostate. × 250.

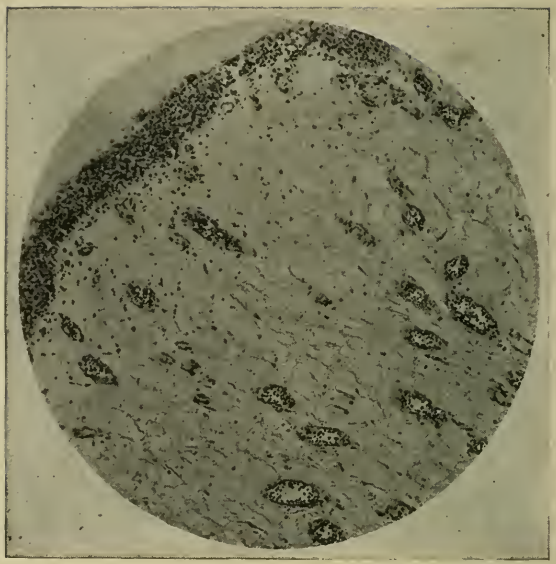

Fig. 11. Surface of myxoma showing mucous tissue and dilated capillaries. × 50.

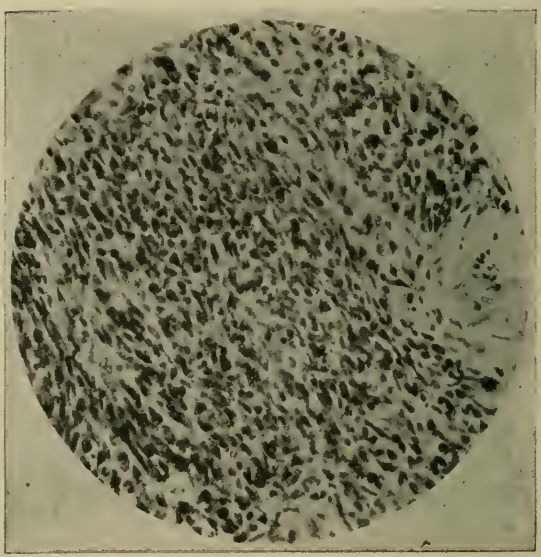

Fig. 12. Spindle and round celled myxosarcoma. × 250.

Fig. 13. Endothelial sarcoma and papilloma, showing that the sarcoma is limited to the stroma. × 250.

ON SOME EXPERIENCES WITH BLOOD-CULTURES IN THE STUDY OF BACTERIAL INFECTIONS.[1]

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Since the fall of 1897, when I found streptococci in the blood of a child suffering from streptococcic intestinal infection (1), in the clinic of my friend and teacher, Professor Escherich, I have been much interested in systemic bacterial infections, and, during the past eight years I have attempted from time to time to study especially the general infections by the pyogenic cocci. The number of cases which we have studied by means of cultures is between 700 and 750. Not all are of value. Many were made at request in cases which proved to be examples of fever due to tuberculosis, or cases not bacterial in origin. Some were unsuccessful for one reason or another. I shall not attempt to cover the entire material—that would be impossible. Only certain points will be taken up, and digressions will be made here and there so as to mention observations that are unusual or particularly interesting. The literature (2) will not be discussed as I prefer to speak at this time of our own experiences. The subject of infections by the typhoid bacillus will be omitted and only such pneumococcus infections as occurred independently of pneumonia will be included.

While the paper will not be a connected one—the breadth of the subject prevents that—I shall take up the following main points:

1. The terminology to be used in the paper.
2. Technical considerations.
3. Organisms found, their frequency, and the types of diseases in which they are encountered.

[1]Read before the Medical Society of the Johns Hopkins Hospital, February 5, 1906, and at the Mount Sinai Clinical Conference of February, 1906. Reprinted from the Johns Hopkins Bulletin, July, 1906.

4. Notes on osteomyelitis, secondary parotitis, intra-abdominal infections, infections of otitic origin and those arising in the genito-urinary tracts of the male and of the female.

5. Notes on certain groups of cases belonging to the domain of internal medicine.

6. Endocarditis; embolic aneurisms.

7. Discussion of negative blood-cultures.

8. Discussion of positive blood-cultures.

9. Diagnostic points.

10. The prognosis in cases in which bacteria have been found in the blood.

I. TERMINOLOGY.

The terminology (3) that I shall use is one based on the work itself and will, I hope, be justified by the observations I shall record. When bacteria attack any part of the body we call the resultant lesion a local infection. There may or may not be evident toxemia; usually there is. If such a local infection is so situated that it is not diagnosed we can call the lesion a cryptic infection. If there is toxemia we have a crypto-genetic toxemia.

If bacteria are present in the blood we have a bacteriemia, or systemic infection. Such a bacteriemia may or may not be accompanied by the establishment of secondary foci (metastatic infections or so-called pyemia). If, when bacteria are in the blood, the point of infection is overlooked, or has healed or is so situated that it is not diagnosed, we are dealing with a cryptogenetic bacteriemia.

In the use of the word bacteriemia I wish to agree with those who use the term to signify the presence of bacteria in the blood without implying anything concerning the question of whether they are multiplying or not. Canon (4) uses the word bacteriemia to indicate the cases in which bacteria are discharged from a local focus and do not multiply in the blood, whereas by septicemia he refers to their multiplication in the blood. The word septicemia, if used at all, should, I believe, be used only to designate the presence of bacteria in the blood. The reasons for this will be made apparent later.

The term secondary infection is best reserved for those cases in which one bacterial infection follows another. For the occurrence of a bacterial infection in the course of a disease not bacterial in

origin, the term intercurrent infection is better. By a mixed infection we mean the co-existence of infections by two or more organisms. The two infections may have occurred simultaneously, or one may be secondary. The first infection at times disappears. For secondary and mixed invasions of the blood-current we can use the terms secondary bacteriemia and mixed bacteriemia.

The term agonal invasion needs no explanation; it is not yet known how often it really occurs. The expression terminal infection (5) needs a commentary. I believe it should really be used to indicate an infection that comes when the patient is about to die of his original disease. Often, however, it is used to indicate the infection that terminates the life of a patient with a chronic disease. Not infrequently a patient in a hospital ward with a chronic nephritis or endocarditis, whose condition is supposed to be hopeless, spontaneously or as the result of treatment rallies and leaves the hospital in quite good condition for a shorter or longer time. If such a patient has the misfortune to acquire a fatal infection in the ward, he is sometimes put down as having died of a terminal infection, when in reality it was a terminating infection. It would be better, I believe, to restrict the use of the expression terminal infection and use at times the expressions secondary fatal infection and intercurrent fatal infection. This would lead to greater stress being laid on preventing such infections.

II. TECHNICAL CONSIDERATIONS.

In the remarks which I shall make on the technical side, I shall not go into the question of how the blood is to be obtained or the difficulties which we may meet. It is generally agreed that the amount should be large, 25 c.c. if possible. We do not rely on microscopic examinations.

The question of the media to be used we must touch upon, even if briefly. For several years we have used a variety of media for each culture, so as to study their relative value, and so as to be able to state, when results were negative, that optimum methods had been used. The routine, except in cases of typhoid fever, was to use plates of agar, serum-agar, glucose-agar and serum-glucose-agar and flasks of bouillon and glucose bouillon with and without serum. When we

expected to find streptococci, staphylococci or pneumococci the blood was used more concentrated. If there was no clue to the organism that was possibly present, the blood was used in varying dilutions. In obscure cases, more than one culture was necessary when all the variations in media were to be tried.

It is hardly possible to state briefly and definitely the relative value of each of these media. In cases in which only a few organisms are present it may be more difficult to decide this question than when they are numerous, as the occurrence of the organisms on one particular plate may be due to chance. At times the fluid media were better, at times the plates. Glucose-agar rarely proved to be of any greater value than ordinary agar; generally it was less favorable. Possibly at another titre it might have been better. Serum-agar often gave a better result than ordinary agar. Glucose-serum media (6) which I suggested some years ago as simple optimum media for bacterial growth, often gave an earlier result, and in some instances were the only media to show growth even when the bacteria were abundant. (This refers especially to the cocci found in certain cases of subacute endocarditis.[1] We have found these media often of advantage in routine work for cultivating the meningococcus and the gonococcus. It would be wise to use them in blood-cultures in cases in which these organisms are looked for. Staphylococci usually grow well on all media.

At times streptococci would grow in glucose-bouillon when they would not grow in ordinary bouillon, and occasionally the opposite was found. At times, they seemed to grow better when the blood was well diluted, but as a rule concentrated blood was more favorable. At times streptococci and staphylococci were found in the flasks growing only in the clot at the bottom.

Media in tubes have been used very little in the past six years, but there is no doubt that in cases in which bacteria are present in very large numbers an earlier result can be obtained by pouring some blood over the surface of slanted media. In obscure cases

[1]Although glucose-agar is not particularly advantageous we continue to use it because it serves as a control on the glucose-serum-agar. If on the serum-glucose-agar plates bacteria are found that grow easily on all media and there is no growth an the glucose-agar plates we can suspect a contamination of the serum.

it is wise to use one or two plates of serum-glucose-agar on the surface of which the blood is poured. This gives the possibility of using pure blood and avoids the overheating of the organisms which may occur during plating.

Glycerine-agar was found to be of no particular advantage. The Wassermann medium (7) (made of 2 per cent. Chapoteaut peptone and pork infusion with a markedly alkaline reaction) in a couple of instances gave very good results.[1] I believe, however, that similar results are obtained by using agar made up of beef infusion with 2 per cent. Witte's or Merck's peptone with a reaction neutral to phenolphthalein.

In certain cases anaërobic work was done. Either the Novy jars or Buchner tubes were used, or the blood was mixed with glucose-agar in deep tubes according to the Veillon method. (8) This last method was used especially in case of abdominal disease. Tissier (9) has pointed out that the intestinal tract contains anaërobes that can be isolated only by the Veillon method, and we have encountered such organisms either by staining methods or in cultures in a number of intra-abdominal infections. They are also to be found in necrotic foci in the mastoid, lungs and other organs. The difficulty in using this method for blood-cultures lies in the fact that a small quantity of blood makes the medium opaque and colonies cannot be seen. To carry out the method properly very many tubes would have to be used. One could think of attempting in some way to rid the blood of red corpuscles.

Before considering the findings in the positive cases, it is necessary to refer to the question of contaminations and to the methods of identifying certain organisms.

In the hands of beginners contaminations are frequent, but with experience they can be almost entirely avoided. It is advisable to study carefully all contaminating organisms, so that if one of them is found in the blood of an obscure case, it be not looked upon as the cause of the disease. Not infrequently one encounters publications in which organisms are described as being the cause of certain

[1]Wassermann in his article states that the medium should be very alkaline, using litmus as an indicator. I found the most advantageous titre was neutrality to phenolphthalein.

diseases, which organisms accurately correspond to those often met with as contaminations.

The contaminations most frequently met are *micrococcus epidermidis albus,* Gram-positive bacilli with and without spores, Gram-negative bacilli of different kinds, organisms of the pseudo-diphtheria group and *micrococcus tetragenus.*[1] An interesting organism occasionally met is a short Gram-negative bacillus which it is difficult to cultivate on other than blood media.

Several years ago one of the laboratory workers found a remarkable contaminating organism in two cases. It was a streptococcus growing like the ordinary streptococci on media without glucose, but growing in large mucoid masses on glucose media. It was Gram-negative. If the Gram test had not been applied and if glucose media had not been used a serious blunder would have been made. Cultures made the next day in both cases proved negative, a result more in accordance with the clinical picture.

The organisms concerning the identification of which I wish to speak are the pneumococci, streptococci, staphylococci, gonococci and meningococci.

Much of the earlier work of other observers and myself is unreliable as the methods for identifying pneumococci were not sufficiently definite in all instances. From what I have seen during the last year I believe that a few of the so-called streptococci[2] which I found in earlier cases may have been pneumococci and vice versa. This is a question into which I enter gladly because Dr. Buerger worked on that subject in our laboratory. Dr. Epstein, the present pathological interne, has been working along the same lines and so far has corroborated Dr. Buerger's results. We have, therefore, adopted them for routine work.

If the organism (Gram-positive) has the typical capsule described by Dr. Buerger (10) it is a pneumococcus. This capsule or rather the capsular membrane is situated at a fair distance from the organism, stains sharply and the capsular substance (between the membrane and the organism) shows little tendency to stain. The cap-

[1]There are some cases reported in which this organism is supposed to have caused a systemic infection (53). We have not encountered such a case.

[2]All the organisms recognized as streptococci precipitated serum-glucose-agar (see below).

sule often shows indentations; these occur at the intervals between the organisms in the diplococcus-form; in chains, the indentations occur between each pair of cocci. (*Streptococcus mucosus capsulatus*[1] is almost never lancet-shaped; its capsule is at a fair distance; it is mucoid and the capsular substance tends to take the stain. There are no indentations.) Other streptococci do not usually have capsules; when they do, the capsule is very close to the organism, and has deep indentations between each of the cocci in the chains.

When the typical capsule of the pneumococcus (or *streptococcus mucosus capsulatus*) is present, the identification can at once be made. If the organism has the streptococcus type capsule, or no capsule, it must be studied, for the organisms just mentioned may lose the type capsule after successive inoculations or under adverse circumstances.

To determine whether such an organism is a streptococcus or a pneumococcus one can use the inulin test and the precipitation test. Dr. Hiss (11) of New York made the very valuable discovery that pneumococci ferment inulin and streptococci do not. He uses the inulin in his well-known serum-water mixture. The reaction is shown by acidification or coagulation of the medium. We found that all the pneumococci fermented inulin (12, 13)[2] and a very few streptococci.

As a control, we have used the precipitation test (15). Some years ago, I noted that streptococci regularly precipitated (whitened) serum-glucose-agar within 48 hours and pneumococci very rarely did. Dr. Buerger (12) found that this held true in a large series of tests.[3]

We have, therefore, followed this scheme. If when the type capsule is absent the organism ferments inulin and does not precipitate,

[1]This organism will doubtless soon be identified in the blood-current now that local infections produced by it are more often recognized.

[2]But not in all generations. Sometimes it was necessary to use Dr. Buerger's modification (14) (addition of peptone). All the organisms identified as pneumococci by the type capsule fermented inulin.

[3]In my original experiments I used ½ per cent. glucose medium. Dr. Buerger, through a suggestion of mine, used 2 per cent. We have been using the ½ per cent. medium for the last few months and find that it is more advantageous.

Only when a streptococcus grows so sparsely that there is little evident growth, is precipitation absent, so that a good growth without precipitation seems to exclude a streptococcus.

it is a pneumococcus, and vice versa it is a streptococcus. If it does both, animal inoculations should be made to try to restore the type capsule.[1]

The differentiation of the organisms by the characters of their growth in plates of blood-agar (16), though useful, cannot be entirely relied upon. I show you a plate made by Dr. Epstein from the blood of a case of pneumonia (17). Whereas the pneumococcus colonies are supposed not to be surrounded by clear areas (hemolysis) this pneumococcus not only produces a large clear ring, but at some distance away there is a second ring of hemolysis.[2] Otherwise the organism has the typical pneumococcus characteristics. The pneumococcus in the sputum caused no hemolysis.

We have had a specimen of a pneumococcus from the blood of a case of infection of the foot, which, when first isolated, had no capsule, grew in chains, fermented inulin and precipitated. After animal inoculation the organism was coccoid, often bacillary, and groups were found surrounded by single capsules. Later animal inoculations resulted in the production of the type pneumococcus capsule.

I cannot enter more fully into this question now, but have said enough to indicate the great care that is necessary in identifying these organisms.

The literature shows that not sufficient care has been taken in distinguishing staphylococci. Professor Welch (19), already in 1891, pointed out that the pigment of *micrococcus aureus* often requires several days for its development and that potato is a favorable medium for its production. Glucose media, we have found, often temporarily cause a loss of the color. We are in the custom of inoculating all white staphylococci on agar, potato and serum-agar, leaving them in the thermostat for 24 hours, and then allowing them to stand outside in diffuse daylight for seven days. We have made no studies on the differentiation of staphylococci by means of hemolysis production or agglutination tests. (20.)[3]

The Gram-negative cocci found in future will need careful study, and their exact status may, in some instances, remain in doubt (par-

[1] *Streptococcus mucosus capsulatus* ferments inulin and does not precipitate.

[2] We had seen concentric (intermittent) hemolysis once before. (18). The organism was a streptococcus.

[3] A possible influence of icteric serum will be discussed later.

ticularly if there is no meningitis or gonorrhea present), for we now know that there is a group of organisms closely allied to the gonococcus and meningococcus. (21.)[1] It will not be enough to identify an organism as a gonococcus because it is Gram-negative and cannot be grown on media. It must be cultivated and studied. We have met with a Gram-negative contaminating diplococcus which was found to have been derived from the ascitic serum used. In another case we found in a post-mortem culture in a case of osteomyelitis (due to *micrococcus aureus*) a Gram-negative organism which was neither gonococcus nor the meningococcus.

The blood-cultures were usually observed for 5 to 7 days, hanging-drops from the flasks being made daily, as well as inoculations on serum media and into glucose-bouillon. The time in which the cultures became positive varied. The earliest two periods were six and eight hours. Often results were obtained in 12 to 16 hours; at times 48 hours or more elapsed. If the organism was a staphylococcus that was slow in its pigment production, five days might elapse before a definite report could be given, but this was very exceptional.

The number of organisms varied from one in 15 c.c. up to 2676 to the cubic centimeter, or up to such a number that the colonies could not be counted. At times the growth was so marked that the separate colonies were indistinguishable and the medium looked simply discolored. The variation in the number of colonies in a given case will be discussed later.

In every instance in which the culture was positive we attempted to confirm the result by cultures made from the primary focus or secondary foci, or by means of later cultures of the blood, before or after death.

In only eight cases were we unable to obtain confirmatory cultures. Either there were no evident lesions, or cultures were not sent in from them when present. In some instances the patient died and a further culture could not be obtained. But in each of the eight instances the clinical picture was in accord. In seven, the diagnosis was acute endocarditis; the eighth was a terminal infection. All

[1]We encountered one such organism (in the pus in the case of otitis media) which produced a disagreeable odor in all media. And Dr. Boggs (22) has described one as occurring in bronchiectasis, which grew in blood only, and produced an odor.

of the cases showed pneumococci or streptococci. All staphylococcus findings were confirmed.

Comparatively few cultures were taken just prior to death, because we were interested in the problems mainly from a diagnostic standpoint. Had more been taken we might have met with more positive findings; a greater variety of organisms might have been found.

We laid no stress on cultures made after death, except as a means of confirming those made during life. A little experience was sufficient to show how cautious we must be in interpreting post-mortem findings.[1] (Of course, the presence of such organisms as the anthrax or glanders bacillus is diagnostic.) Whether cultures made from the arm veins would give more reliable results than the heart-blood, as Canon (23) and Gradwohl (24) claim, our experience is too small to permit us to state.

III. ORGANISMS FOUND: FREQUENCY: SHORT LIST OF CONDITIONS IN WHICH THEY WERE ISOLATED: MIXED AND SECONDARY INFECTIONS.

Before giving the facts of interest in this connection I want to state that I shall give no percentages as to the frequency of positive findings in various forms of diseases. Such figures are misleading, the results depending on the type of cases studied and the stage of the disease at which they were studied. This will be made more evident by the general remarks on negative blood-cultures.

The organisms found were: streptococci, the pneumococcus, *micrococcus aureus, micrococcus citreus, micrococcus albus, bacillus pyocyaneus,* paracolon bacillus, *bacillus coli, bacillus proteus vulgaris* and the gonococcus.

Streptococci were isolated in 58 cases. Some were instances of terminal infections, or infections arising from the tonsils, the ears and mastoid processes, or the genito-urinary tract. In some cases there were infected wounds; in others the source of infection could not be found. Some were characterized by joint or bone lesions. Endocarditis was frequent. One was a case of erythema nodosum. In one case the source of infection was an abscess at the root of the lung secondary to esophageal carcinoma; in another it was a suppu-

[1] I shall not discuss the question of whether some positive post-mortem findings may not be due to agonal invasion and post-mortem multiplication.

rating tabetic joint of the great toe. In one case there resulted a hemorrhagic myositis of both forearms. Metastatic bone lesions were not uncommon; once there resulted an extensive osteomyelitis o the vertebral column.

Micrococcus aureus was found 28 times (25). Many of the cases were instances of osteomyelitis; some were secondary to furuncles or cellulitis; some were cryptogenetic bacteriemias. Two were post-partum infections; bacteriemia due to staphylococci is rare under such conditions.

In a number of cases endocarditis was present. In one case a cystitis was the primary focus, and in two cases abscesses of the prostate occurred secondarily. Of particular interest were two cases with metastases in the muscles and one with a small abscess of the sclera.

The only staphylococcus albus findings confirmed by subsequent cultures were made (with one exception to be discussed later) within two days ante-mortem and were confirmed by heart-cultures. These were looked upon as agonal invasions. We have not met with a single case in which the finding of the albus in the blood was followed by the establishment of a metastatic depot. On the whole we look upon the organism as playing little role in systemic infections. This is in keeping with the infrequency of our finding it in local lesions of any importance, a point long ago emphasized by Professor Welch (19).

There are two observations in this connection which I wish to mention. One refers to a case of acute endocarditis of the aortic valve with an inflammatory swelling in the septum. The staphylococcus albus was cultivated in the blood 12 and 10 days ante-mortem, and also at the autopsy. The spreads made from the swelling in the septum showed many staphylococci. Although there is no doubt of the validity of the cultures, the organisms at the time were not observed as we now observe them, and, therefore, we cannot exclude the possibility that we were dealing with a staphylococcus aureus.

The other observation was made in the case of an infant two weeks old, suffering from hemorrhages of the new-born with jaundice and fever, supposedly due to an infection. The blood which we were

fortunate enough to obtain from a vein in front of the ankle showed *micrococcus albus*. A culture made 40 hours post-mortem showed a pure aureus in the first colonies. As I had never observed a *micrococcus albus* invasion followed by one by the aureus, I suspected that the icterus may have temporarily inhibited the pigment production.

A short time later a specimen of bile from a case of cholecystitis was sent to us. The first culture showed an albus that could not be changed to an aureus. A culture made the next day showed an albus that became aureus after three days; the third culture gave an aureus in two days, and all subsequent cultures showed the aureus at once.

We made a few experiments trying to prove that bile might temporarily inhibit the pigment production, but were unsuccessful. We hope to repeat the experiments with icteric serum (or bile from inflamed gall-bladders), because it is known that they act differently from normal bile itself. This is shown by the work on the agglutination of typhoid bacilli by icteric serum. Whereas icteric serum has more or less agglutinating power, bile itself has practically none (26).

For the present, *micrococcus albus* found in a case with icterus should be particularly studied, and carefully considered.

Pneumococci, apart from pneumonia cases, were found four times. Twice there was an acute endocarditis,[1] source unknown. Once there was an infection between two toes, and once there was a suppurative ethmoiditis and frontal sinusitis with brain abscess.

Micrococcus citreus was isolated once in a case of osteomyelitis; the bone showed the same organism. The patient recovered.

Bacillus pyocyaneus was found once (in a case published by Dr. Brill and myself) (27) secondary to *micrococcus aureus* bacteriemia. The case was fatal.

A paracolon bacillus was isolated once in a case clinically resembling cholecystitis (published in extenso by Dr. A. A. Berg and myself) (28).

The gonococcus was believed to have been found once, ante-mortem, with a streptococcus, in a case of post-abortive infection. The Gram-negative coccus could, however, not be further cultivated, and to-day I would not be willing to say that it was definitely a gonococcus

[1]In one of these two cases, in the service of Dr. Alfred Meyer, there was an embolism of the abdominal aorta.

(see above under "Technical Considerations").[1] In a recent case the gonococcus was found twice in the blood. There were no endocarditis phenomena. Unfortunately an autopsy was not obtained.

Bacillus proteus was found by Dr. Gerster one day ante-mortem with streptococci in a case of uremia.[2] *Bacillus coli* was found in the blood of a patient upon whom the operation of internal urethrotomy had been performed. The case was fatal.

In a case of infection of the gall-bladder by the gas bacillus (Welch) an attempt was made to cultivate the organism from the blood. Cultures were made and also direct animal inoculations, but the result was negative. The organism has been found several times in the blood by other observers. The bacillus mucosus (capsulatus) we have isolated twice; in one case there was a primary parametritis, in the other, an abscess of the prostate. In the second case, the bacilli disappeared from the blood before the fatal termination.

Mixed and secondary infections were uncommon. All such cases were fatal. Those encountered were:

(a) A streptococcus with a possible gonococcus.

(b) A streptococcus and the proteus bacterium.

(c) In the paracolon case, a culture made one day ante-mortem showed also streptococci and *micrococcus albus.* This was confirmed at the autopsy.

(d) In a child dying of an umbilical infection, a streptococcus was found with *micrococcus aureus.*

(e) A pyocyaneus infection secondary to one by the aureus.

(f) In a case recently under the observation of Dr. Rudisch and Dr. Sachs, with the clinical picture of a hemichorea, *micrococcus aureus* was found; the second culture showed mainly the same but also a streptococcus; in the third culture the streptococcus predominated. The post-mortem cultures showed no aureus in the blood. This was a striking example of a secondary infection crowding out the primary.[3]

When a primary focus shows two or more organisms, the blood sometimes shows only one. Recently, in a case of phlegmon of the

[1]Post-mortem the gonococcus was found twice. (See under "Endocarditis.")

[2]I am indebted to Dr. Goldenberg for this case.

[3]This case was studied by Dr. Epstein and Dr. A. Cohn.

arm, due to a streptococcus and the *micrococcus aureus*, only the former was found in the blood.

IV. NOTES ON THE FINDINGS IN SOME SURGICAL CONDITIONS.

In most of the cases of acute osteomyelitis,[1] particularly those due to the *micrococcus aureus*, organisms were found in the blood. There is a peculiar difference between the cases due to staphylococci and those due to streptococci. In the staphylococcus cases the bone disease is apt to stand out in the clinical picture, whereas in the streptococcus cases we look upon it more often as the result of a bacteriemia. Of course, we know that all the osteomyelitic lesions are secondary, due to a recent invasion by bacteria or old deposit. But the staphylococcus bone lesion once established seems to cause a more marked bacteriemia than the streptococcus cases.

Most of the acute staphylococcus cases occurred in children. As Jordan (29) well says, "Osteomyelitis is the septicemia of adolescence." That is to say, in children bacterial invasion of the blood is apt to set up bone lesions because the growing bones are points of diminished resistance. In adults metastatic bone infections are less common.

In some of the staphylococcus bone infections in children, when the bacteriemia was marked, interesting cutaneous lesions were found. These consisted of pustules in the scalp and slightly purulent miliaria or pustules scattered over the entire body or part of the body. The lesion usually first appeared on the scalp or over the shins. The lesions, including the miliaria, all gave cultures of the *micrococcus aureus* (ordinary miliaria alba show the *micrococcus epidermidis albus*). All the cases in which these lesions were found were fatal. Skin lesions have been often described in cases of bacterial infection, but I do not know that attention has been called particularly to the scalp lesions. I believe the lesions which I have described are due to infections of sweat glands. The question of whether this is due to an attempt at elimination is left open.[2]

The few cases of osteomyelitis of the jaw which were studied

[1]These cases occurred in the services of Dr. A. Gerster and Dr. Lilienthal.

[2]Werther (30) describes a case of streptococcus osteomyelitis with papules in the skin having a central vesicle; in one excised lesion he found a necrotic inflammation of a sweat gland.

showed no bacteriemia even when accompanied by cavernous sinus thrombosis.

A remarkable case was that of a man who died of a fulminating osteomyelitis of the femur after he had suffered for eight years from recurrent staphylococcic bone and joint infections (31). The original infection followed an operation for the relief of hemorrhoids. On the day before death no bacteria were found in the blood. It would look as if the blood had developed marked bactericidal power, and as if the infection of the femur were due to cocci deposited long before. This was the only case of severe staphylococcus osteomyelitis, in which bacteria were not found in the blood. In erysipelas the results were negative except in one case primarily intra-nasal.

In many cases of secondary parotitis no bacteria were present in the blood. In only one case of streptococcemia did we find a streptococcus infection of the parotid. In other cases of local or general streptococcus infection, or intra-abdominal infections, a secondary parotitis was due to the *micrococcus aureus*. These observations strengthen the view that most cases of secondary parotitis are not metastatic infections, but are mouth infections (32).

In intra-abdominal infections the results were quite unexpected. I shall cite a few. In cholecystitis the results were negative. Even in some cases with secondary pulmonary metastatic infections there was no bacteriemia.[1]

In a series of 25 cases of appendicitis, the results were negative, even anaërobically. Here also in some very severe cases the antemortem cultures were negative (in a few, the post-mortem also). Occasionally systemic infection must occur, as shown by a case with a negative blood-culture which died a few weeks later and showed an acute endocarditis and purulent infarcts in the kidney. A later culture would probably have been positive.

In one of the series of cases there was a chronic endocarditis with erythema nodosum. In another, the pus showed *B. proteus fluorescens*, the cause of certain cases of acute toxic febrile icterus (33)—(so-called Weil's disease).[2]

[1]In making blood-cultures in cases of cholecystitis, the methods should be adapted to the finding of the typhoid bacillus, as the latter occurs fairly often in cholecystitis.

[2]We had no opportunity of investigating any case in which the appendicitis appeared to be the result of a systemic infection.

In about 25 cases of peritonitis (mainly of intestinal origin), the blood was sterile; in some just before death. In the series are a few of the cases of streptococcus and pneumococcus peritonitis occurring in the course of chronic parenchymatous nephritis. These cases have a peculiar clinical picture which I hope to describe at a later time. Bertelsmann (34) has also had negative results in peritonitis.

In seven cases of pylephlebitis[1] and three supposed cases (no autopsy in two, recovery[2] in one) most of which were suppurative, the results were negative. There are positive cass in the literature. I have not yet gone over all of them to see in how many cases cultures were made early in the disease (35) (36).

In infections arising from the female pelvic organs[3] (especially after abortion or delivery at term) the findings were of particular interest. The organisms found were streptococci and the *micrococcus aureus*. (The latter occurred twice; such cases are rare.) There was quite a large number of positive results. But in some of the cases with extensive thrombosis in the veins, with or without parametritis, the blood-cultures remained sterile. In one of these cases the cava was completely thrombosed; in another there was parietal purulent thrombosis of the cava with metastatic abscesses of the lungs and pyopneumothorax. In a third case, there was an abscess of the clitoris, with abscess in the broad ligament due to thrombophlebitis and pulmonary abscesses. In a fourth there was a parametritic abscess with thrombosis of the cava and metastatic abscesses of the lung, all the lesions showing streptococci, a pseudo-tubercle bacillus and some other organisms.

In infections of otitic origin[4] there were similar results. There were severe cases without bacteriemia. There were cases with bacteriemia and recovery. At times the disappearance of the bacteriemia was due to operation on the sinus or jugular vein. And there were cases of sinus thrombosis with secondary pulmonary lesions without bacteriemia. In all the cases a streptococcus was found.

[1]Included among surgical conditions because most often occurring in connection with surgical diseases.

[2]For the privilege of investigating this private case I am indebted to Dr. Manges.

[3]These cases were in the services of Dr. Brettauer and Dr. Krug.

[4]In Dr. Gruening's service.

In bladder and kidney infections there were few instances of systemic infection (the material studied was small). In the pyelitis of pregnancy we had negative results. In one fatal case of suppurative thrombosis of the iliac vein after urethrotomy, the first culture was positive and the later one negative. The organisms found were the streptococcus, *micrococcus aureus,* the bacillus *mucosus capsulatus,* and *B. coli.* In these organs, metastatic lesions were common.

NOTE.—The frequency of negative results in the types of intra-abdominal disease discussed are particularly interesting when one remembers that the causative organisms are, except for the anaërobes, capable of easy cultivation. I would like to repeat that if more cultures had been made within a few days before death, there might have been more positive results. Clinically, the results are in harmony.

V. NOTES ON FINDINGS IN CERTAIN MEDICAL CONDITIONS.

I should now like to direct your attention to the results obtained in some selected types of disease usually regarded as belonging to the domain of internal medicine. In some of the conditions which I shall mention there is no evidence that they need be associated with a bacteriemia. Positive results have been obtained in some of the diseases grouped here by other writers.

In several cases of pseudo-leukemia the results were negative, even when the temperature was of the intermittent type described by Ebstein.

In tuberculosis we met with no secondary systemic infections.

In two cases of multiple obliterating endophlebitis (once fatal),[1] two cases of acute ascending paralysis (Landry's) and in one of febrile neuro-myositis, there were also negative results.

In the group of cases described by Dr. Brill (37), which resemble typhoid fever somewhat, and which have been considered to have been possibly cases of paratyphoid fever, we could not succeed in isolating any organisms from the blood. There is no proof yet that they are cases of paratyphoid, and should, therefore, be classed for the present as a separate group.

Of a large number of cases of acute leukemia, cultures were made in six. All gave negative results except two in which there was an agonal invasion by *micrococcus albus.* A positive finding in a case of acute leukemia would have to be carefully analyzed. Besides the possibility of a terminal infection there might be a bacteriemia arising

[1]In these cases anaërobic cultures were also used.

from one of the infections often found in these cases (particularly about the mouth). Apart from this I can imagine that a case might arise in which it would appear probable that the disease was due to a bacterial infection. For a study of a large number of cases certainly gives one the impression that the disease is due to changes in the blood-forming organs (particularly the marrow) which could be due to a variety of causes, just as has long ago been found to be the case with pseudo-leukemia infantum. In children, in infections, one occasionally meets with blood-pictures that resemble those found in some cases of acute leukemia.

In cases of "visceral lesions of the erythema group" (Osler) (38) and in various forms of purpura, the results were negative. In a series of remarkable cases of erythematous lesions with fever, lasting a number of weeks, with secondary renal or pulmonary lesions, there were negative results, except in one. This was a case in Dr. Brill's service of erythema multiforme (particularly erythema nodosum) with joint inflammations and high fever running several weeks, and ending in recovery with stiff joints. In one culture out of five a few colonies of an attenuated streptococcus were found, possessed of feeble pathogenic power (transient joint symptoms in rabbits). This shows the necessity of repeated cultures in such types of disease.

Of five fatal cases of acute degeneration of the liver (acute yellow atrophy) cultures were made in two, with negative results.[1]

In rheumatism, arthritis deformans and gonorrheal rheumatism, no bacteria were found in the blood. (In two cases of rheumatism the fluid aspirated from the joints showed no bacteria. These cells were mainly polynuclear.)

NOTE.—In this section we have discussed a number of medical diseases, most of which are probably due to different causes in different cases. Dr. Epstein, will, I hope, later report on cases of typhoid fever, pneumonia, and meningitis. I might note here that in two cases of cerebro-spinal meningitis, we recovered the meningococcus from the blood before the symptoms of meningitis developed. The patients had fever and a hemorrhagic rash. In another case, there were meningococci in the cerebro-spinal fluid and pneumococci in the blood. Post-mortem: a pneumococcus broncho-pneumonia was found.

[1] I believe that it would be better to include in this group only cases for which no cause is found.

VI. ENDOCARDITIS: EMBOLIC ANEURISMS.

The most interesting condition connected with the subject of bacteriemias is endocarditis (39). The study of these cases by means of blood-cultures makes very definite Leube's (40) view that the acute endocarditis in these cases is a secondary infection. As is well known, such a bacteriemia may affect normal valves, but more often diseased valves (41). A primary focus may or may not be evident. Some of the cases are examples of terminal infections.

There is often a marked disproportion between the number of bacteria in the blood and the extent of the lesion. There may be an almost countless number of bacteria in the blood and only very small deposits on the valves, or there may be large vegetations with hardly any bacteria in the blood. As a rule, they are present in fair numbers.

Again, in a case of chronic endocarditis there may be a marked bacteriemia and at the autopsy we may find only a little deposit of fibrin on the wall of the heart or no lesion whatsoever. I show you some hearts to illustrate this. One is of particular interest. The patient, who was admitted into Dr. Brettauer's service because of a post-partum infection, had a marked bacteriemia, heart-murmurs and all the symptoms of so-called "ulcerative endocarditis" (petechiæ, high temperatures, chills, etc). And still, as you see, the heart shows only an old mitral stenosis and no recent lesion. The case was one of bacteriemia in a patient with chronic endocarditis. There is no reason why such a case (with a less marked bacteriemia) should not get well. It might then wrongly go on record as an "ulcerative endocarditis" with recovery.

I believe it is best to call all the cases, acute, subacute or chronic endocarditis, according to the clinical course, then attach the name of the infecting organism when it is found (thus, "acute streptococcus endocarditis"), and attach an adjective—vegetative, polypoid, ulcerative, etc., descriptive of the type of lesion, when it is seen. The hearts which I demonstrate to you to-night show how difficult it often is to diagnose beforehand the type of lesion.

The organisms found by us in these cases have been streptococci, pneumococci, *micrococcus aureus* and gonococcus.

Of the last there were two cases. In the first, the cultures were made when we started the work and favorable media were not used.

The result was negative, the gonococci being found post-mortem. The second case was diagnosed post-mortem: no cultures were requested during life. In a third case of endocarditis following gonorrhea, streptococci were found in the blood during life and at the autopsy. When the patient entered the hospital there were no longer gonococci in the urine, but there were streptococci.[1]

In some of the cases of endocarditis the number of bacteria varied from time to time. In some, they increased up to the time of death; in one, they decreased. There seem to be two types of cases: one in which a bacteriemia which in itself would not necessarily be fatal, sets up an endocarditis which keeps up the bacteriemia and dominates the clinical picture. In the second type the original bacteriemia plays the main role.

In some cases of acute endocarditis with marked lesions we have looked for and found acute enlargement of the nodes at the bifurcation of the trachea. In cases in which there were no acute pulmonary lesions present we have attributed the enlargement to the endocardial lesions, as the lymphatics which drain the heart enter these nodes (intertracheo-bronchial group of Poirier) (42). I might mention here that in cases of marked bacteriemia one finds at times the lymph-nodes all over the body somewhat enlarged, pink or red in color.

In two cases of acute staphylococcus endocarditis with marked cerebral symptoms, the cerebro-spinal fluid presented interesting changes. In both, leucocytes and cocci were present, the latter being mainly intra-cellular. In one of the cases the cocci were numerous but it was very difficult to cultivate them. The cultures from the blood gave profuse growths (2,200 colonies to the c.c.).[2] There was but slight increase in the leucocytes.

There are many cases of chronic endocarditis with fever without any demonstrable bacteriemia. In some cases causes for the fever may be found elsewhere in the body. If no cause can be found, the

[1]Since writing the above we have encountered two cases of general gonococcus infection, one with negative result and one with two positive cultures. At the autopsy in the former, the gonococci were found in an abscess of the mitral valve. The surrounding thrombus mass showed no gonococci.

[2]A study of the relative opsonic contents of the blood and cerebro-spinal fluids in such cases might give results of interest.

acute symptoms may be due, at least at times, to organisms not to be cultivated by our present methods. I have suspected that in some cases with irregular fever, at times quite high, recurring from time to time, the temperature may be due to discharge into the blood-current of bits of thrombotic masses or old vegetations (43).

There is another group of febrile cases lasting a number of weeks or months, in which bacteria are repeatedly demonstrable in the blood (44). In such cases we have never found staphylococci but always attenuated streptococci or diplococci. In some cases the organisms are fairly abundant; in some very sparse. In one case, a week before death, they were very numerous and grew on serum-glucose-agar plates only. Later they grew on other media but were kept alive with great difficulty. In one case we found only two colonies in 25 c.c. of blood. In five instances they were short, small streptococci and in three a lancet-shaped diplococcus which did not appear to be a pneumococcus.[1] The last case in which the diplococcus was found occurred during the past year, and we made a careful study which showed that the organism had no capsule, did not ferment inulin and did precipitate serum-glucose-agar. It was, therefore, definitely not a pneumococcus.

Several of the organisms correspond to those described by Lenhartz (39) and Schottmueller (45), but the others seemed to be even more attenuated (they grew at first only on serum-glucose-agar or the Wassermann medium). I wish I could give an accurate differential description of these organisms from ordinary streptococci by means of their fermentative reactions (in carbo-hydrates), but careful studies made by Dr. Buerger[2] show that it is not wise at present to depend upon dieffrentiation by such means. The organisms were harly pathogenic—at most they would produce peritonitis in mice, and then at times by repeated transfers only. Direct inoculations of blood into mice, rabbits, and guinea-pigs were tried in two cases with negative results.

In all these cases there was a history of joint manifestations at the apparent onset of the symptoms or months or years previously. In all which we could examine post mortem, there were present an old,

[1] I am indebted to Dr. A. Mayer and Dr. H. Herman, of New York, for the privilege of investigating two of these cases.

[2] Journal Exp. Med. Vol. ix, 1907.

chronic endocarditis on which recent lesions were grafted. I show you hearts from four such cases. You will notice that the vegetations are very friable (in one less so), and in each instance there is a mural endocarditis of the left auricle (in one also of the anterior flap of the mitral and the wall of the left ventricle over the septum membranaceum).

Some of these patients are able to walk about the wards although there are cocci in their blood. But although the symptoms are generally mild, and though the temperature may be quite low for a long time, it may rise sharply from time to time, and toward the end of the disease there may be chills and high temperature.

All of the cases of this type which we could follow were fatal. One of them left our hospital feeling quite well after an illness lasting some months, and died four months later at another hospital. Streptococci had been found three times in her blood.

One patient who was in Dr. Manges' service developed an aneurism in the right popliteal artery with subsequent thrombosis in the sac. He left the hospital after a prolonged stay; the subsequent history is unknown. Lenhartz describes two recoveries but does not state how long the cases were observed. What the portal of entry in these cases was, I do not know. It may have been the tonsils. The possibility of acute exacerbations due to bacteria which have remained dormant and become attenuated in old endocardial lesions, must be thought of (analogous to what is known to occur in osteo-myelitis).

At this time I do not wish to discuss in detail the question of the etiology of rheumatism (46), but will say that I believe it would be wiser for the present to call all these cases subacute or chronic streptococcus or diplococcus endocarditis, and not to call them rheumatic endocarditis because of the rheumatic history. According to the terminology that I would suggest, cases of endocarditis occurring in what we call rheumatism should be called acute, subacute, or chronic endocarditis, and the fact that no organism was indicated in the name would at once show that the cause of the endocarditis in the particular case had not been found.

I have indicated the importance and frequency of acute and subacute endocarditis associated with bacteriemia, and, without attempting to discuss the diagnosis of such conditions, I would like to refer

to a point which has been of great value. It is well known that petechiæ occur in these cases. The particular value of the occurrence of conjunctival petechiæ and "the small hemorrhages in the palms and soles with slightly nodular character" I learned from Dr. Janeway when I had the privilege of serving under him.[1] Very occasionally conjunctival petechiæ are found in cases of chronic endocarditis in which no bacteria are demonstrable in the blood, and occasionally they occur when there is a bacteriemia without any acute endocarditis. Further, in some of the cases of acute endocarditis with bacteriemia the petechiæ may appear late or not at all. Nevertheless, a sharp lookout for them will often direct attention to an acute endocarditis to which there was no other clue.[2]

One of the most striking features of some cases of endocarditis is the establishment of aneurisms. We have seen five cases (48). In two no cultures could be obtained during life; in one, streptococci were found post mortem, and in the other streptococci and *micrococcus aureus*. Twice the lesion occurred in the cases in which streptococci had been repeatedly found in the blood. In one, streptococci were found in the walls of the aneurisms (of the hepatic, mesenteric, and a branch of the femoral arteries) post-mortem. The other case was the patient with the aneurisms of the popliteal artery mentioned above.

In a fifth case, recently observed in Dr. Rudisch's service, there developed embolic aneurisms of the left iliac artery and a branch of the renal artery. Repeated blood-cultures were negative. At the autopsy there were none of the usual lesions of acute endocarditis, but there was a large mass of calcareous vegetations, and a piece of lime was found in the aneurism of the iliac artery. (There was also an aneurism of the mitral valve.) This case shows that it is probable that embolic aneurisms are not always bacterial in nature.

In some cases of acute bacterial endocarditis one finds occasionally a small, tender swelling on a superficial vessel, which persists or disappears. I have not been able to determine yet whether these may be very small aneurisms or inflammatory deposits.

[1]The observation was later published by Dr. Janeway (47).

[2]I have, of course, made no attempt to discuss causes of conjunctival petechiæ other than endocarditis and bacteriemia.

VII. REMARKS ON NEGATIVE BLOOD-CULTURES.

It is necessary to discuss, even if briefly, the significance of negative and positive results, particularly with reference to the cases of infection by the ordinary pyogenic cocci. The first and most important question is, do bacteria enter the blood-current in every case of local infection? This question is a difficult one to answer because we cannot examine the blood every day for bacteria. We can obtain a general idea, however, from the results in a large series of cases. And from these we cannot deny the possibility that in every case of local infection bacteria may enter the blood-current at one time or another. Even very small foci may be the starting-point of a bacteriema. How often all the bacteria which enter the blood are gotten rid of by the bactericidal powers[1] of the body and can, therefore, not be cultivated, even on optimum media, one can only surmise. Practically these are cases without bacteriemia.

From a study of all the cases in our series, I am inclined to the following beliefs as to negative findings:[2]

1. The case may not be one of infection by one of the ordinary bacteria. It may be a case of tuberculosis, actinomycosis or syphilis; it may be due to an infection by protozoa; it may be due to parasites of any kind which have not been isolated.

2. The case is due to one of the ordinary organisms, but there are no bacteria in the blood-current. This may occur in any type of infection. I have indicated how it can occur, at least at times, in certain cases of intra-abdominal infections, and in cases with even extensive thromboses of the cerebral sinuses, or of the intra-abdominal veins with or without secondary foci in the liver or lungs. For such cases as the last I am in the habit of using the term incomplete or partial bacteriemia. (In all these cases the bacteria are, of course, usually carried into the liver or lungs by pieces of throm-

[1] As you are aware, it is not definitely settled how large a role the bactericidal power of the blood plays; some believe other agencies play a much greater role in ridding the body of bacteria. When I use the term "bactericidal power," I use it to indicate briefly all the defensive powers of the body.

[2] The remarks on negative and positive blood-cultures are made on the basis of clinical observation, the blood-cultures and the post-mortem examinations.

bi.)[1] When the diagnosis is not made this is a cryptic bacteriemia. The cases involving the portal system can be called portal bacteriemias.

3. Bacteria may have been present in the blood and have disappeared from it with or without the disappearance of the primary focus and with or without the establishment of secondary foci. They may, of course, remain after metastatic foci are established. We have never seen them disappear completely when the endocardium was involved.

4. In the cases in which we can take for granted that a secondary (and possibly a fatal focus) is established by the passage through the blood of a bit of infected clot, it is easy to see how there need be no bacteria demonstrable in the blood (Example: A brain abscess due to embolism from a thrombosed branch of the pulmonary vein in empyema). At times without evident thrombosis a secondary focus is set up by a very short invasion of the blood-stream (paranephritis abscess due to a small focus in the kidney after a furuncle of the face).

The last two types of formation of metastases are sometimes called infection by transport (50).

VIII. REMARKS ON POSITIVE BLOOD-CULTURES.

Concerning positive results I wish to make the following remarks: I group the cases of infection into two groups: A. With a primary focus of some extent. B. With a minute (e.g. a small furuncle) or no demonstrable primary focus.

I shall refer to endocarditis separately from other metastatic foci, for reasons which will be very evident from my remarks.

A. 1. If the bacteria are present in the blood and the primary infection is successfully treated, the bacteria in the blood may slowly or rapidly disappear. At times one finds what one may consider the end of the bacteriemia (e.g., one colony of pneumococci in 12

[1] I believe, although I have had no proof of such a condition, that it is possible that blood-cultures might at times be negative when metastatic foci were set up in the lungs by way of the thoracic duct. Dr. MacCallum (49) has drawn attention to processes in the lung set up by emboli of cells by way of the thoracic duct in typhoid fever. In a personal interview he has told me that he believes that in agreement with what I had suspected bacteria are carried along with the cells and are responsible for many of the local phenomena.

c.c. of blood in a case of infection of the foot, when the patient was apparently recovering). Occasionally the bacteria disappear from the blood even though the primary focus is not eradicated.

2. Whether the primary focus has been successfully treated or not, the bacteria may remain in the blood, metastatic foci may or may not develop, the endocardium may or may not be involved. If the primary focus has healed and no endocarditis has resulted and no metastatic infections, we can presume that the bacteria have multiplied. Whether they multiply in the large vessels or only in the capillaries, or, as some maintain, in the endothelium of certain organs, it is not necessary to discuss now.

3. When secondary foci develop (excepting endocarditis) the bacteria may not persist in the blood-current (as mentioned under "negative results").

4. There is a possibility that bacteriemia may result from surgical intervention or an infected focus, when much manipulation has to be done or from extensive handling during dressings. We have seen a possible instance of the former and Mœller describes an example of the latter. Both cases recovered. How often such a bacteriemia might be harmful future studies may show. Such studies would have to include cultures before and after operations, and would have to be very carefully interpreted.[1]

B. When the original focus is very small or none can be found and there is a bacteriemia, conditions are the same as discussed under heading A-2.

If an acute endocarditis develops, the number of bacteria found may be small or large. If there is no endocarditis and no other secondary foci, the number is large.

In general it seems that the bacteriemia is often due mainly to the invasion of bacteria from a local focus, and many organisms may be found in the blood under such conditions. In one case of osteomyelitis of the humerus there were found 500 colonies of *micrococcus aureus* to the cubic centimeter of blood. A blood-culture made four days after operation was sterile, the patient recovering.

[1]If the Bier traetment of acute local infections by hyperemia should continue to be as favorably looked upon as it is now, it would be a great advantage from the standpoint under discussion. Canon has also drawn attention to this in his book.

Multiplication of the bacteria is probably not as common as it was supposed to be, and it is only when there are large numbers present without the presence of a focus from which they could be discharged, that we can presume that they have multiplied.

It is very tempting to enter into a discussion of the problems concerning the elimination of the bacteria from the body (by the bile, sweat, milk, and urine). Much has been written concerning the question whether the presence of the bacteria in the urine is due to an active eliminative process or whether it is simply an accident due to the fact that the lesions set up by the bacteria and their poisons make the renal filter less perfect. It would exceed the limits of this paper to discuss this problem alone (51). But I would like to draw attention to a few of our findings in the urine of the cases with bacteriemia. The difficulties in this work, and points to be regarded for a careful interpretation of the findings, I shall not now detail.

When the bacteria were present in fairly large numbers in the blood they were usually found in the urine, and in cases in which they disappeared from the blood, the bacteria in the urine disappeared first. In a couple of cases, however, they persisted in the urine after none were demonstrable in the blood. In one such case we found metastatic abscesses in the kidneys. Whether the bladder lesions found in severe cases of invasion of the blood by streptococci or staphylococci cause a persistent bacteriemia, I do not know. (In all cases in which marked secondary bladder lesions were present at autopsy, the bacteriemia had persisted.)

IX. DIAGNOSTIC CONSIDERATIONS.

Much might be said in a tentative way concerning the diagnostic uses of blood-cultures, but I shall refer to a few points only, basing my remarks on some of the observations embodied in the paper.

1. In some cases a blood-culture is the only means of recognizing that the patient is suffering from a bacterial infection. This is so well known that it need not be further referred to. It is important to remember, however, that the bacteriemia which is found may be secondary to a previous local or general infection by another organism (e.g. secondary bacteriemia), or it may present an intercurrent or terminal bacteriemia in some non-bacterial disease. As an example

of the former I might mention a case with streptococci in the blood in whom a subphrenic abscess was diagnosed. The autopsy showed that the original disease was typhoid fever, with splenic infarction.

2. The fact that bacteria are not demonstrable in the blood-current in some cases of pylephlebitis may be made use of in a diagnostic way. In some cases of this condition when there is no evidence of a primary focus, it is necessary to differentiate it from acute endocarditis. In the cases of acute endocarditis which would be simulated, however, we have always found bacteria in the blood if two cultures were made (very rarely were two cultures necessary). A year ago we made use of this point in a case in which we suspected the existence of a suppurative thrombosis of the splenic and portal veins. Two negative blood-cultures spoke against an acute endocarditis. The autopsy corroborated the diagnosis.

3. Similarly, negative results may be of use in the differential diagnosis between endocarditis and thromboses of the pelvic veins or vena cava due to infection through the genito-urinary tract (especially post-mortem infections). In some of these cases, even when the inferior cava is partially or entirely closed, there are no local symptoms, not even edema of the legs or distension of the veins.[1]

The main point to be emphasized is that in fevers of obscure origin, especially if the temperature be intermittent and there are chills, and the blood-cultures are negative, one must keep in mind the possibility of the existence of venous thromboses acting as a form of cryptic focus.

4. In two cases of sinus thrombosis of otitic origin, the finding of some streptococci in the blood induced the surgeon (Dr. Gruening) to operate, although the local signs were apparently insufficient to account for all the symptoms. In both cases extensive thromboses were found; both patients recovered.[2]

In the one case the clinical picture looked like typhoid; in the

[1]Professor Welch (52) states that this may be due to the fact that the deep veins dilate. We had come to the same conclusion as we often observed that in cases of severe bacterial infection there was a collapse of the superficial veins all over the body; at times this was so marked that it was impossible to obtain any blood when it was attempted to make a culture.

[2]The bacteriemia disappeared shortly after operation. The jugular vein was tied in only one. A third case has recently been observed.

other like malaria. The local signs were such that it was possible that the patients were suffering from the otitic disease plus the other conditions, but the finding of streptococci in the blood was considered to signify that the local disease could be the cause of all the symptoms.

5. When a local infection has been operated upon and the symptoms persist for a number of days, and there is a bacteriemia, the primary focus should be carefully examined. If it is in good condition careful search should be made for metastases so that they can be attended to promptly. Only if an acute endocarditis develops, or if the bacteria are present in large numbers, should one be satisfied with not finding metastases. In some infections there may be a secondary purulent phlebitis which gives no local symptoms. This is one of the difficulties. At times it is difficult to diagnosticate metastases in the internal organs (especially the lungs, kidneys and spleen).

6. If the primary focus is healed or healing and there is no bacteriemia and the symptoms persist, metastases must be carefully looked for. (In the case of a colleague who had had a cellulitis of the arm, which had been incised, but in whom the fever persisted, the diagnosis of "sepsis" and "pleurisy" had been made, but the blood-culture being negative, a careful search was instituted. A paranephritic abscess was located after a few days. An operation upon this focus was followed by recovery.)

The metastases may be very difficult to locate, as mentioned above. In one case, there were found multiple abscesses of the kidney due to *micrococcus aurcus;* the blood-culture had been negative and there were no local symptoms. I believe that careful studies of the urine may in the future help us to locate such lesions. The data which we have thus far collected on this point are insufficient for publication.

7. Under the same conditions as described under heading 6, the symptoms may be due to the onset of some other condition. (Example: A child with empyema; local focus apparently doing well; fever re-appears; blood-culture negative; condition proves to be tubercular meningitis.)

The conditions that hold good (under heading 6) when no bac-

teriemia is evident could also be stated to hold true when very few bacteria are found, except that in a few cases endocarditis may occur with only a few bacteria in the blood.

It becomes clear that although blood-cultures are of great service, they do not lessen the necessity for careful clinical observation, diagnosis and judgment.

X. PROGNOSIS.

What is the prognosis in the cases in which a bacteriemia can be demonstrated?

To consider this question fully would necessitate entering into a discussion of the problems concerning how the bacteria are disposed of in the body—problems which have not yet been definitely solved, and the exposition of which it is best to leave to others better equipped for the purpose. But we can say this much—that we must allow that even a moderate number of bacteria in the blood does harm by the demands made upon the protective agencies of the body and by means of the toxins liberated by the bacteria (before and after destruction) and that the character and location of the primary focus and the secondary foci play a great role in the prognosis.

Acute endocarditis plays a very important role. In all the cases in which we have made the clinical diagnosis, the case has been fatal. Others have reported recoveries. And it cannot be stated how often the valves of the heart are implicated in such a way that the lesion is not recognized (and how often such a lesion could become the origin of chronic disease).

In our series of cases the results have been as follows: In 58 cases of streptococcemia, there were six recoveries, or almost 11 per cent. Of 28 cases of staphylococcemia, eight recovered, or nearly 29 per cent. Taking both sets together we have 86 cases with 16 per cent. recoveries. (Of pneumococcus cases there were four with one recovery; the cases are too few in number to be included in the calculations.)

The lower percentage of recoveries in the streptococcus cases does not necessarily mean that they are the more serious, for our observations cover medical as well as surgical cases; they, therefore, include many cases of terminal infections and of endocarditis.

Bertelsmann, who studied surgical cases only, found 48 instances of bacteriemia in 154 cases; 21 cases recovered, or 43 per cent. Of 28 streptococcus cases, 19 recovered, or 68 per cent.; and of 13 staphylococcus aureus cases four, or 30 per cent.

Lenhartz, who studied mainly medical cases (there were included a number of cases of post-partum infections), found 17 per cent. recoveries in 77 cases. Of 47 streptococcus cases, eight recovered, or 17 per cent.; and of 13 staphylococcus cases, one recovered (7½ per cent).

Canon reports 38 cases of bacteriemia with five recoveries (13 per cent).

While I do not think the number in any of the series is large enough, and while I do not believe in comparing the results obtained by different investigators in work of this kind, I think we can draw two conclusions:

1. That the number of recoveries reported depends to a great extent on the type of cases studied.

2. That the bacteriemia met with often does not prevent a favorable outcome.

CONCLUDING NOTES.

The statements which I have made, especially regarding the significance of negative and positive results, I present to you as theses. It is not possible for any one investigator to establish in a reasonable period their validity. They embody our experience up to the present time and we shall be glad to publish any observations that may be contradictory.

There are many points on which I might have touched, especially of a more direct therapeutic nature, which might have been of greater interest than those which I have presented to you. But I have said enough to indicate how many and how varied are the problems connected with the subject of bacteriemia, and if I have succeeded in throwing any new light on any of these problems or in suggesting some new lines of thought, I shall feel that I have in some small way earned your kind attention.

It is a pleasure and a duty to express my thanks to numerous former and present members of the house staff of the hospital for much help in making many of the observations, and to them and

the visiting staff for many suggestions and much kind co-operation and encouragement.

ADDENDUM: AUGUST 30, 1907.

Since reading the paper, we have investigated many additional cases (making a total of 1,500 cases), some of which present unusual points of interest. We hope to publish these in the near future.

1. Concentric hemolysis has been observed a number of times, particularly with pneumococci. It cannot, therefore, be a very unusual phenomenon. Occasionally colonies of organisms on the plates are surrounded by a bright red circular zone, while the rest of the plate shows hemolyses.

2. The streptococcus mucosus has been reported as being found in the blood-current by Otten (*D. Arch. f. klin. Med.*, Bd. LXXXVI, p. 434). We have encountered it three times; in two cases the ear was the portal of invasion. In both cases, the cocci were present in remarkably large numbers. (Cases to be published later.) The third case was one of pneumonia.

3. Glucose-agar has been found by Dr. Epstein to be very advantageous in the study of the bacteriemia in typhoid fever. On it the typhoid bacillus develops a characteristic colony (*Trans. N. Y. Path. Soc.*, October, 1906).

4. Recent work in our laboratory shows that the human blood causes remarkable changes in pneumococci. They may even lose the property of fermenting inulin. (Dr. Buerger and Dr. Ryttenberg have taken up this study and will report on it later.)

5. We have seen several cases of temporary invasion of the blood-current by bacteria in urethral fever. A few cases of coli bacillemia in bladder inflammation have been encountered. In two of them the patient recovered, notwithstanding a marked general infection.

6. Ammonium oxalate seems to be of use in making blood-culture work more feasible in private practice. The blood is obtained in a solution of ammonium oxalate and then mixed with media in the laboratory (see paper by Dr. Epstein in this volume).

7. We have recently seen one case of general streptococcus infection (fatal) with the clinical picture of purpura rheumatica and one

case of intercurrent streptococcus general infection in a case of acute leukemia.

8. The glanders bacillus was found in the blood in one case by Dr. Crohn, the present pathological interne.

9. During the past year Dr. Celler succeeded in producing in the rabbit valvular and mural endocarditis with splenic infarcts, by means of inoculations of the attenuated streptococcus found in the blood of a case of subacute endocarditis.

10. We have had an occasional positive result in gall-bladder infections. In one case of pylephlebitis due to infection of the biliary passages, we found pneumococci in the blood. There was present a parietal thrombosis of the hepatic vein.

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27. American Journal of Med. Sci., August, 1899.
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29. Beitraege z. Klin. Chir., Bd. X, 1893, p. 587.
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31. Cf. KOCHER and TAVEL, l. c.
JORDAN: Muench. Med. Woch., No. 21, 1904.
32. First suggested by Hanau and Piliet in 1889. See BUCKNALL: Lancet, 1905, II, pp. 1158-1164.
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35. Cf. ROLLESTON: Diseases of the Liver, 1905, p. 77.
DR. ROLLESTON has kindly written to me that the remarks made in his book were based on the literature. The main cases of pylephlebitis with negative cultures are contained in Dr. A. Gerster's paper, which cases were studied by me. Langdon Brown (Brit. Med. Journal, November 25, 1905, p. 1393) cites one case with negative culture, but does not state what media were used.
36. GERSTER: Medical Record (N. Y.), June 27, 1903.
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In these places will be found the literature and many original observations. Of particular interest are Litten's studies:
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41. A full discussion of pathology and clinical aspects is given by
OSLER: Gulstonian Lectures: British Med. Journal, March 7, 1885, and Practitioner, Vol. L, March, 1893.
42. POIRIER AND CUNÉO: The Lymphatics, 1904, p. 229.
43. THACHER: American Journ. Med. Sci., January, 1906, p. 33, suggests the possibility of passive congestion of the viscera as a cause for the fever.
44. The first findings in such cases in our laboratory were made by Dr. Gershel, a former assistant, without any knowledge of Lenhartz's paper. The latter contains an admirable account of the clinical picture in these cases.
45. SCHOTTMUELLER: L.c.
46. COLE: Journ. Inf. Diseases, V, 1905, p. 714.
HARRIS: Trans Chicago Path. Soc., June 12, 1905, p. 303.

Beattie: Journ. of Med. Research, Vol. XIV, 1906, p. 399.

47. Janeway, E. G.: Med. News, August 26, 1899.

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49. MacCallum, W. G.: American Medicine, 1903, p. 452.
See also Risel: Virch. Arch., Bd. CLXXXII, p. 258, and Loehlein: L.c. p. 269.

50. v. Kahlden: L.c.

51. A good review of the literature is given by
Churchman: Amer. Med., Vol. XI, 1906, p. 111; see also
Noetzel: Wiener Klin. Woch., Bd. XVI, 1903, p. 1036.
Schwarz: Zeitschr. f. Heilk., Neue Folge, Bd. VI, 1905, p. 295.

52. Welch: Thrombosis, Allbutt's System, 1899, Vol. VII, p. 217.

53. Fornaca: Rev. in Centralbl. f. innere Med., 1903, p. 1056. See also Muench. Med. Woch., 1905, p. 2385.

CASES OF MYCOTIC ANEURISMS.*

By E. Libman, M.D.

It is not my purpose to go fully into the question of the pathology and causation of mycotic aneurisms nor to give full descriptions of the cases which we have seen at the Mount Sinai Hospital during the past four years. Before giving my brief sketch of the cases, however, I should like to mention a few points concerning aneurisms of this class, in doing which I shall follow closely the conclusions in Eppinger's paper on aneurisms.

In mycotic or parasitic disease of the valves of the heart mycotic emboli may be thrown off and be caught in arteries, especially at their point of division. Such a mycosis is generally due to staphylococci or streptococci. Such an embolus or secondary thrombosis may occur when the valves show the remains only of a mycotic endocarditis. At the position of the embolic thrombosis there is first an exudative inflammation, then there is an acute periarteritis with destruction of the media, and the elastica and intima burst. If there should be a rupture of all coats of the vessel hemorrhage occurs either into the surrounding tissue or into the adventitia. As a result of these lesions there is a bulging of the vessel and in the wall of the dilatation all layers of the arterial wall are to be found. Such a condition must be considered an aneurism. These aneurisms are characterized by their multiplicity.

At the entrance to the aneurism the intima and the elastica are cut short; the ends of the latter are curled in, indicating that there has been a tear; this tear is the mechanical explanation of the aneurism. The muscularis in some cases is torn at the entrance to the aneurism.

*Trans. N. Y. Path. Society,, April, 1905. Presented at the Mount Sinai Clinical Conference of Nov., 1906.

This may be partial or complete. The adventitia also takes part in the formation of the wall and at times is the only part of the wall left in the aneurismal sac proper.

Eppinger further goes into the question of what changes occur when the aneurisms become chronic. He also points out the manner in which such aneurisms may become larger due to recrudescence, acute periarterial or mesarterial inflammations. Similar aneurisms, as is well known, can be produced by the presence of an animal parasite and occur in the mesenteric artery of horses where they are produced by a parasite—the strongylus armatus.

In Albutt's System of Medicine, in the article by Welch on "Embolism" there will be found a complete description of this condition and the complete literature. Welch draws attention to the fact that such aneurisms generally correspond to the point of lodgment of the embolus and are not situated proximally to it.

Osler reported in 1885 a very remarkable case in which there was an acute endocarditis and on the arch of the aorta there were four aneurisms. Three were small, not larger than cherries and one was of the size of a billiard ball. The small ones were not noticeable as aneurisms from the inside but looked like fungous vegetations on separating which little slits could be seen leading to a saccular dilatation of the middle and outer coats. The large aneurism was thin walled and at its end and over the whole lining membrane of the sac there were many greyish green vegetations, some of which had perforated the sac and caused the rupture into the pericardium. Osler presumed that the ulceration had led to the aneurisms in the smaller sacs and the larger one he looked upon as a unique instance of a mycotic endarteritis.

This case of Osler's and a few other observations* have made it seem probable that mycotic aneurisms are not always to be explained in the way described by Eppinger, although in the larger number the explanation given by him seems to be the correct one.

The cases which I wish to present to-night are briefly as follows: (For the histories of the first two I am indebted to Dr. Joseph Wiener and for that of the third to Dr. Rudisch. There was a

*Of particular interest in this connection are cases of acute vegetative endarteritis of the open ductus arteriosus and a case described by Holst of aortitis with two aneurisms due to gonorrheal infection.

fourth case in the hospital several years ago in the service of Dr. Manges but this case left the hospital and the further course of the disease is unknown).

Case I.—W. W., 53 years of age, admitted October 8, 1900, to the service of Dr. J. Wiener. This patient took sick about a year previous to admission with chills, fever and sweating which occurred every two days and lasted about half an hour in all. After two weeks he was well for a time and then began to have the same symptoms over again until about a month ago. Since that time he has been having a feeling of weight in the epigastrium after eating, and pains radiating to the back and between the shoulders. His appetite was good. He lost 40 pounds in the last few weeks. Temperature on admission 99.6; urine negative.

Physical Examination.—General condition cachectic; slight icterus; thickening of the arteries. At the apex is a systolic murmur transmitted to the left; it is also heard over the arch and lower third of the sternum; the heart is enlarged both to the left and to the right. Examination of the stomach and abdomen reveals nothing except an indistinct small mass felt just to the left and below the umbilicus.

On October 11th the temperature rose to 103. Examination by test meal proved negative.

October 12.—Hemoglobin 33%; leucocytes 25,000.

October 13.—Exploratory laparotomy by Dr. J. Wiener. Exploratory aspiration was first performed in the splenic region and some clear serum was obtained on the left side at a depth of about three inches. Median laparatomy was then performed and the mass which had been felt was found to be a small aneurismal sac lying in the mesentery near the root. The subsequent history is unimportant except for the occurrence of some hemoptyses.

On October 28th there was marked twitching of the right hand and the patient immediately became unconscious and died early on the morning of the 29th.

At the post-mortem examination there was found a marked hypertrophy and dilatation of the left ventricle, atheroma of the mitral valve with ulceration and recent vegetations; there were two aneurismal pouches on the edge of the flap. The posterior flap showed some fine vegetations. The arch of the aorta was dilated and showed marked atheroma. At the hilus of the spleen was found an aneurism of the splenic artery measuring about six cm. in diameter; just below there was a sacculation of about 60 c.c. of bloody fluid. The kidneys showed marked chronic interstitial nephritis. In the mesentery there were found two well-established aneurisms, one small area of

ulceration and two developing aneurisms. Both the ulcerated areas and the well-established aneurisms showed distinctly the sharp break in the intima and the tendency to localization at the bifurcation of the vessels. These lesions were all situated in the branches of the superior mesenteric artery which supply the small intestine.

The bacteriologic examination of this case showed the presence of streptococci in the lesions.

Case II.—May C., 25 years of age, admitted April 13th, 1901. The previous history is negative. The present history is that six weeks before admission the patient took cold, had cough and mucous expectoration. She had tonsillitis at the same time; this lasted about two weeks. As the cough was getting better she noticed pain in the left groin on coughing and several small nodules were felt there. Three weeks before admission the patient noticed an increase in the swelling in the left groin which then began to pulsate; there was much pain present.

On admission there was found a loud, blowing systolic murmur at the apex of the heart which was heard in the axilla and posteriorly; second pulmonic sound accentuated. In the left femoral region there was an oval, elastic swelling about the size of a bean; the tumor was painful to the touch, had expansile pulsation, and over it there was heard a loud systolic diastolic humming murmur with systolic accentuation. A diagnosis was made of arteriovenous aneurism and the patient operated upon on the day of admission by Dr. Wiener.

The external iliac artery was tied in two places and cut between the ligatures, with the intention of tying the femoral artery below the sac. Resection of the lower end of the sac was attempted, but the blunt edge of the knife perforated the sac and profuse hemorrhage resulted which was controlled with considerable difficulty; finally, however, the femoral vein and artery were tied and all bleeding ceased.

The pulse and temperature rose after the operation and the patient complained of great pain in the left leg. Sensation was absent in the toes. During the night of April 14th the pulse became much poorer. It became stronger temporarily but the patient died on the following day.

At the autopsy the mitral valve was found thickened; the aortic flaps insufficient; on the under surface of one of the aortic flaps there were very large vegetations; on the center of this flap and at the margins of the other flaps were fine vegetations. There was marked atheroma of the aortic arch. The kidneys showed chronic interstitial nephritis; there was a small aneurism on one of the lesser branches of the renal artery. The intestinal vessels showed

no changes. The external iliac artery was found divided and the ends ligated. The femoral artery showed quite marked endarteritic changes. There was an aneurism at the point where the profunda was given off. The sac contained thrombotic masses most of which were not at all decolorized. The remains of the vessel wall were present in the sac. The femoral vein had a small defect in its wall externally and anteriorly which led into the sac.

Bacteriological examination showed the presence of staphylococcus aureus in the aneurismal sacs of the femoral and renal arteries. The heart blood showed streptococci and staphylococcus aureus.

Case III.—G. S., 24 years of age was admitted to the service of Dr. Rudisch, September 18th, 1903. The history of this case is of much interest, but owing to its great length I can give but a few points here.

Previous History.—Rheumatism in ankles and knees at the age of 9 and 14. No cardiac palpitation or dyspnea. The present illness is of 12 weeks' duration. For the first week of this time he had diarrhea. After this stopped he still felt poorly and was weak and had poor appetite. He had occasional cramp-like pains in the abdomen and also slight pain in the ankles and wrists. For four weeks his feet have been swollen whenever he was out of bed and for the past four or five days he has had cough. He still has slight fever at times and sweats a great deal at night.

Physical Examination.—Slight cyanosis; slight clubbing of the fingers; lungs negative. Heart: Apex beat visible and palpable in the fourth space, one finger inside of the nipple. At the apex is a short systolic thrill and a short systolic murmur transmitted to the anterior axillary line, also the pulmonic area. The first heart sound is very sharp and the second pulmonic sound accentuated. No phenomena about the joints. Leucocytes 12,400; hæmoglobin 50%.

September 23.—The temperature which was 102° on admission ranges between 99° and 101°. Urine is acid; shows a trace of albumin and some hyaline granular casts, also a few red and white blood corpuscles. There are petechial spots on the conjunctiva, palm of the left hand and on the cheeks. The diagnosis was made of mitral stenosis and acute endocarditis. The differential blood count shows 76½% polynuclears, 22% lymphocytes and 1½% eosinophiles.

October 4.—There are new petechiæ. Treatment by intravenous injections of collargol.

October 19.—At the junction of the upper and middle third of the right thigh just to the outer side of the femoral artery is an elongated bulging mass 1½ inch long which runs parallel to the femoral artery and is slightly tender. It does not seem to pulsate and does not disappear when the artery is occluded.

October 21.—Bruit and expansile pulsation detected in the swelling in the femoral region. The diagnosis is made of the presence of a mycotic aneurism.

October 26.—The mass has increased and is distinctly cystic; seems to be attached to the bone.

October 28.—Acute parotitis on the left side.

October 29.—On aspiration of the mass in the right thigh pure blood is obtained.

October 31.—Attack of right hemiplegia with absolute aphasia; during the day gradual, partial return of speech.

November 2.—Marked motor aphasia. Diagnosis made of probable rupture of mycotic aneurism of one of the branches of the left Sylvian artery.

November 3.—Parototis has disappeared.

November 16.—Heart dullness extends 4½ cm. to the right of the middle of the sternum.

November 29.—Operation performed by Dr. Lilienthal. An incision was made over the elastic swelling which was found to consist of a softening laminated blood clot. The lateral aspect of the femur had been eroded for about two inches of its length and to a depth of about ⅜ of an inch and the walls of the defect were quite rough. The clot was removed and the cavity firmly packed.

December 14.—Hemorrhage from aneurismal sac controlled by packing.

December 26.—Femoral artery tied by Dr. Lilienthal, the bleeding having been found to come from a small rupture in the wall of the artery.

January 1, 1904.—Sudden rise of temperature to 103.8; evidences of pneumonia on the right side of the chest. The patient died on the evening of the same day.

During the stay of this patient in the hospital his temperature occasionally rose to 102°, 103° and 104° but generally only for one day at a time. During long periods it ranged between 97 and 101 and even 99 to 100. Pulse ranged between 80 and 100 but later rose to 120. White blood count varied between 10,000 and 15,000. Collargol seemed to have no effect upon the course of the disease.

Bacteriological Examination.—On September 23d, September 30th, October 23d and November 2d, blood cultures showed the presence of a small number of attenuated streptococci which were possessed of moderate hemolytic power. At the time of the operation upon the aneurism in the thigh cultures were made from the laminated clot and streptococci found.

At the post-mortem examination there were found pneumonic areas in both lower lobes of the lungs. The heart showed hypertrophy of

the left ventricle and dilatation and hypertrophy of the right auricle and ventricle. The mitral valve showed a moderate stenosis. There were bright yellowish green vegetations on the flaps and on the surface of the auricle. There were small, yellow infarcted areas in the heart wall but no emboli were found in the branches of the coronary artery. The spleen, which was enlarged was deformed by recent and old infarcts. The infarcts in the spleen were of the striking yellowish color which we have repeatedly found in splenic and renal infarcts in cases of acute endocarditis due to attenuated diplococci and streptococci. The kidney showed recent and old infarcts. On the branches of the superior mesenteric artery there were several aneurisms, two of these being about the size of a walnut and the other two about the size of a bean. The liver was very large, congested, fatty, and there was a large aneurism at the hilus developed from the right branch of the hepatic artery. Near the surface of the liver were numerous small, irregular yellowish areas. Part of the right femur was removed. It showed marked erosion. The exact origin of the aneurism could not be traced as the aneurism had been opened up during life and the sac at the post-mortem examination was found almost entirely destroyed by suppuration.

Bacteriological examination showed the presence of the same attenuated streptococci in all the organs that had been present during life.

There are a few other points to which I should like to draw special attention. In the second case we have to do with an arteriovenous aneurism of the femoral artery, apparently secondary to a tonsillitis. In the third case the rapidity with which the femur was eroded was certainly very striking. It will also be noted that in all three of the cases there was present a chronic interstitial nephritis. It is likely that this predisposed to a general infection and made both the valves and the vessels more liable to being attacked by the bacteria.

ADDENDUM.

I append here the important papers recorded since the publication of Welch's monograph:

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Simonds: Deut. med Woch., 1901, p. 353.

Ling: Reviewed in Lancet, June 29, 1901, p. 1846.

Duckworth: Medical Press and Circular, June 12, 1901.

Canon: Mittheilungen aus den Grenzgebieten, Vol. x, p. 419.

Gabriel: Wien. klin. Woch., 1901, p. 1051.

Huchard and Bergougnian: Journal des practiciens, Jan. 4, 1902.

Galavardin: Cent. f. innere Medizin, 1902, p. 293.

Brion: Deut. Aerzte-Zeitung, 1901, No. 18.

A CASE OF EMBOLIC ANEURISMS.*

By E. Libman, M. D.

The case to which I wish to refer to-night differs in some respects from those previously presented by me.

The first case of embolic aneurism was described by Tufnell in 1853. In 1873 Ponfick described some cases of embolic aneurism in which he believed that the aneurisms were due to the impact of the embolus on the wall of the artery, particularly if the embolism were a calcareous one. Later a number of other authors showed that these aneurisms usually occurred with acute infective endocarditis, and the opinion has gained ground that these aneurisms are always due to the effect of bacteria-carrying emboli. The case which I wish to present to-night brings up the question whether it is not possible to have an aneurism occur in the way which Ponfick has suggested.

The patient was admitted to the service of Dr. Rudisch at Mt. Sinai Hospital on June 26, of this year. He was a man, twenty-two years of age, who had had measles and scarlet fever in childhood, small-pox at the age of two, and pneumonia at two and one-half years. Up to last winter he had not been sick in any way. At that time he had some pain and redness, but no swelling, in the left hip and in both knee joints. There were no cardiac symptoms until about a month ago.

Present Illness.—About one month ago the patient began to cough and expectorate bloody mucus. There was cardiac palpitation and a sense of distress over the precordium. During this time he has had severe pain in both knees. The knees were red but not swollen about two months ago.

On admission the patient was found to have an aortic insufficiency. Because of a very marked rough thrill left in the vessels of the neck it was suspected that there were large vegetations. At this time his temperature ranged between 98° and 102° F. About

*Presented at the Mount Sinai Clinical Conference of Nov., 1906.

a week after admission he complained of pain in the left groin; pressure upon the femoral artery caused pain. There was a distinct thrill present in the left femoral and the pulse below had disappeared. There was a systolic murmur in the artery at the point of tenderness.

July 14.—There is a petechial spot in the right lower conjunctiva. The patient was watched closely as it was suspected that an embolic aneurism had developed. This occurred within ten days. It was located apparently above the point of closure of the femoral. There were present a thrill and systolic murmur; later a double murmur and a distinct enlargement of the artery. The temperature ranged between 99° and 104° F., being very irregular.

On August 6, the patient died suddenly.

During the course of the illness the leucocyte count varied between 6,600 and 9,200. The urine showed no red blood cells at any time; occasionally there was a trace of albumin with a few leucocytes and an occasional hyaline cast.

Three blood cultures were made, 15 c.c being used twice and 11 c.c. once. The last blood culture was taken a few days before death. The blood was inoculated on bouillons and agars with and without the addition of glucose or serum or both. The Wasserman medium was also used. Part of the material was cultivated anerobically. All three blood cultures were negative.

The autopsy was performed under great difficulties. Fortunately we were able to obtain the heart and kidneys in good condition, but the iliac artery had to be removed through an incision in the lateral scrotal fold. The specimen is for that reason not in good condition for study; nevertheless, it shows sufficiently well the important points. Without going into too much detail the following were the conditions found.

At the lower part of the iliac artery there was a sacculated aneurism about 2 cm. in diameter. There was some calcareous material present in the vessel. The intima at the entrance to the aneurism was not cut off, but continues directly into the sac.

The lungs show brown induration.

The mitral valve and the chordæ tendinæ showed some old verrucose vegetations. The aortic valves were thickened, shrunken, and insufficient. On two of the flaps there were some small old vegetations. The anterior flap was ulcerated and hanging from it was a friable, calcareous mass. The aortic flap of the mitral valve showed an aneurism the size of a large cherry projecting into the left auricle and obstructing the auriculo-ventricular orifice.

The spleen showed one small infarction.

The kidneys showed some chronic nephritis. In the right kidney there was a small aneurism of one of the smaller branches of the

renal artery. The vessel entering it contained a recent thrombus. The kidney cortex about the aneurism presented a large, anemic, infarcted area.

The cultures from the heart are unreliable as the organ had to be dragged down through the abdominal cavity; likewise the aneurism of the iliac artery was contaminated because of the method of removal. The cultures from the cut surface of the spleen, however, taken on a large number of media proved to be absolutely sterile.

Considering that the blood cultures during life were all sterile and the spleen culture post mortem was negative, and that the aneurism of the iliac artery was of a different type from that which has been found in cases of infective embolism, I believe that it is possible that in this case the aneurism of the iliac artery may have been non-mycotic in character.

It is not difficult to find bacteria in the blood in cases of bacterial endocarditis. I appreciate, of course, that in some of the cases due to attenuated diplococci or streptococci, the organisms are difficult to find, but, as a rule, in three cultures, one succeeds in finding them.

I believe, we will eventually recognize several types of aneurisms, embolic or mycotic in origin: (1) Non-mycotic embolic aneurisms. (2) Mycotic embolic aneurisms. (3) Aneurisms due to infection of the wall of vessels due to bacteria in the lumen. We must also keep in mind the possibility of infection of pre-existing aneurisms.

THE VALUE OF LUMBAR PUNCTURE: WITH PARTICULAR REFERENCE TO THE DIAGNOSIS OF TUBERCULOUS MENINGITIS.[1]

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In order to study the pathological changes which occur in the cerebrospinal fluid in disease of the brain and spinal cord, it is necessary to have a clear conception of the character of this fluid in normal healthy individuals.

Since Quincke, in 1891, first published his method of performing lumbar puncture, our knowledge of the subject has enormously increased. At that time it was advocated principally as a therapeutic procedure, while now its broadest field is that of diagnosis. Then it was rarely practiced, but to-day it is resorted to as frequently and fearlessly as the puncture of the chest in suspected empyema. Its therapeutic value, both as a palliative and curative measure, will not be entered into here.

The method of procedure as advised by Quincke, and to this day practiced with but slight modifications, is too familiar to need repetition, the only point which might be emphasized being its absolute harmlessness when done aseptically, and the caution to stop the flow of fluid when the pressure has reached 20-25 mm. of mercury. This, according to Pfaundler, is the normal subarachnoid pressure in the sitting position, about one-half of which disappears when the patient lies down. In cases of tumor of the brain, particularly of the cerebellum, the procedure is not without risk, several sudden deaths having been reported after withdrawal of comparatively small amounts of fluid.

The amount of cerebrospinal fluid in normal individuals varies, but the consensus of opinion is that it is never very large, usually measuring less than 10 c.c. Under pathological conditions, however, it may be increased, even up to several hundred cubic centimeters.

The normal fluid is always absolutely colorless. This, is also true for cases of tumor of the brain or spinal cord, brain abscess, hydro-

[1] The conclusions reached in this paper are based on the examination of 617 cerebrospinal fluids received in the laboratory from the various services of the hospital, since August, 1902, at which time the writer entered upon his duties.

cephalus, tabes, auto-intoxication, meningeal irritation, etc.—in fact, for all fluids withdrawn in cases not due to inflammation of the meninges. In tuberculous meningitis, while at first glance the fluid may appear to be colorless, on comparing it with a tube of distilled water, as recommended by Wentworth, it is usually seen to be slightly opalescent. Bernheim and Moser even found it necessary at times to gently shake the fluid while examining by reflected light, to determine the cloudiness. The depth of color depends upon the number of cellular elements present. Purulent meningitis may give a yellowish fluid, while hemorrhages into the ventricles, trauma to the head or spine, sinus thrombosis, or puncture of a blood-vessel by the trocar, may give a bloody fluid. If the blood has remained in the spinal canal for any length of time, it may even be distinctly brown in color on withdrawal.

In reaction the fluid is faintly alkaline, both in health and disease, the amount of alkalinity varying between 0.3 and 0.5 to phenolphthalein. In meningococcus cases, if the fluid be allowed to stand at room temperature for several days, the growth of the meningococcus may make the reaction faintly acid.

Regarding the specific gravity, authorities are well agreed that it usually ranges from 1.001 to 1.009.

The question as to the formation of a fibrin net is of considerable diagnostic importance. In cases of tuberculous and purulent meningitis it is seldom absent after standing six to twelve hours in the ice-box, while in cases of tumor or abscess of the brain, sinus thrombosis, hydrocephalus, meningeal irritation, etc., it never forms even after many days. Wentworth even goes so far as to state that the slightest cloudiness of the fluid, with the formation of a fibrin net, is pathognomonic of an inflammatory exudation in the meninges, and is never absent in cases of meningitis.

Albumin is a normal ingredient of the cerebrospinal fluid, being present in amounts varying from 0.2 to 1.0 parts in 1,000. In tuberculous fluids it is somewhat increased, while in purulent meningitis cases, it is considerably above the normal. Heller's contact ring test, as used for urines, is a quick and reliable method of estimating the comparative amount of albumin present. In healthy persons, and in all non-inflammatory fluids, we get a very faint or no ring. Gerhardt finds the amount of albumin increased, not only in inflammatory conditions, but also in cases of hydrocephalus, tumor, cerebral lues, and paralysis. The writer has at times failed to confirm this statement. It is important that no blood be present if the test is to be of any value.

With reference to the presence of sugar, the accepted idea corresponds to the conclusions reached by Comba.

"I. That in the cerebrospinal fluid drawn during life from a

healthy person, there constantly exists a glucose-like reducing substance. The average quantity is four to five centigrams to 100 c.c.

"II. In tuberculous meningitis the glucose is found in small amounts at the onset, but is absent toward the end.

"III. In purulent meningitis glucose is always absent.

"IV. The diminution and disappearance of glucose in the cerebrospinal fluid are probably due more to the glycolytic action of the nucleoproteids of the leucocytes than to that of the bacteria contained in the exudate.

"V. The proportion of glucose is less than that of the blood, which tends to prove that it is a product of secretion, rather than of transudation."

Until recently, the writer fully concurred in these statements, but with the last fifty-three tuberculous fluids, it will be seen that Fehling's solution was decidedly reduced in twelve, making almost 25% of positive reactions. And, further, it will be noted, that these reactions all occurred but a few days, at most, before death.

The presence of this reducing substance in a considerable number of tuberculous fluids, cannot be too strongly emphasized, as the accepted opinion is, that the presence of sugar in a cerebrospinal fluid is sufficient in itself, to exclude the diagnosis of an advanced tuberculous meningitis.

The question might be asked: How do we account for its universal absence in the first forty-eight fluids? The answer lies in the statement, that very often it requires as much as 10 c.c of fluid to demonstrate the presence of sugar, smaller amounts giving a negative result, and that heretofore, we were content to base our conclusions on five c.c. or less of fluid.

Fluids withdrawn from cases of purulent meningitis, never showed reduction of Fehling's solution.

TABLE I.

No.	Spreads	Cytology		Days Ante mortem	Sugar
		Leucocytes			
		Mononuclear	Polynuclear		
1	tubercle bacilli	++	+	4	negative
2	tubercle bacilli	+++	+	1	negative
3	negative	+++	+	6	negative
	tubercle bacilli	+++	+	1	negative
4	tubercle bacilli	+++	+	3	negative
5	negative	+++	+	5	negative
	tubercle bacilli	+++	+	1	negative
6	negative	+++	+	11	negative
	negative	+++	+	3	negative
	tubercle bacilli	+++	+	2	negative
	tubercle bacilli	+++	+	1	negative
7	tubercle bacilli	+++	+	5	negative

TABLE I — CONTINUED.

8	tubercle bacilli	+++	+	1	negative
9	tubercle bacilli	+++	+	1	negative
10	tubercle bacilli	++	+	8	negative
11	tubercle bacilli	++	+	12	negative
13	tubercle bacilli	+++	+	5	negative
12	tubercle bacilli	+++	+	6	negative
14	negative	no fluid	no fluid	3	negative
	negative	no fluid	no fluid	2	negative
15	tubercle bacilli	+++	+	1	negative
16	negative	++	++	8	negative
	negative	++	++	6	negative
	tubercle bacilli	++	++	2	negative
17	tubercle bacilli	+++	+	1	negative
18	tubercle bacilli	97%	3%	2	negative
19	tubercle bacilli	blood	blood	6	negative
20	tubercle bacilli	+++	+	1	negative
21	tubercle bacilli	97%	3%	10	negative
22	tubercle bacilli	70%	30%	2	negative
23	negative	45%	55%	3	negative
	negative	blood	blood	1	negative
24	tubercle bacilli	+++	+	8	negative
	tubercle bacilli	85%	15%	2	negative
25	tubercle bacilli	+++	+	1	negative
26	tubercle bacilli	+++	+	2	negative
27	tubercle bacilli	65%	35%	7	negative
28	tubercle bacilli	60%	40%	9	negative
29	negative	40%	60%	8	negative
	tubercle bacilli	35%	65%	1	negative
30	tubercle bacilli	50%	50%	2	negative
31	tubercle bacilli	85%	15%	1	negative
32	tubercle bacilli	85%	15%	2	negative
33	tubercle bacilli	80%	20%	1	negative
34	tubercle bacilli	90%	10%	2	negative
35	tubercle bacilli	90%	10%	2	negative
36	tubercle bacilli	80%	20%	1	negative
37	tubercle bacilli	85%	15%	1	negative
38	tubercle bacilli	78%	22%	7	negative
39	tubercle bacilli	90%	10%	2	negative
40	tubercle bacilli	70%	30%	8	negative
41	tubercle bacilli	70%	30%	4	negative
42	tubercle bacilli	90%	10%	1	negative
43	tubercle bacilli	65%	35%	3	negative
44	tubercle bacilli	90%	10%	3	negative
45	tubercle bacilli	60%	40%	2	negative
46	tubercle bacilli	92%	8%	3	negative
47	tubercle bacilli	90%	10%	4	negative
48	tubercle bacilli	50%	50%	4	negative
49	tubercle bacilli	50%	50%	3	reduction
50	tubercle bacilli	95%	5%	5	negative
51	tubercle bacilli	95%	5%	1	negative
52	tubercle bacilli	90%	10%	8	negative
53	tubercle bacilli	90%	10%	1	negative
54	tubercle bacilli	50%	50%	9	negative
55	tubercle bacilli	92%	8%	2	negative
56	tubercle bacilli	90%	10%	3	negative
57	tubercle bacilli	90%	10%	3	negative

TABLE I—CONTINUED.

58	tubercle bacilli	85%	15%	3	negative
59	tubercle bacilli	55%	45%	4	negative
60	tubercle bacilli	80%	20%	3	negative
61	tubercle bacilli	85%	15%	1	negative
62	tubercle bacilli	85%	15%	1	negative
63	tubercle bacilli	80%	20%	2	negative
64	tubercle bacilli	68%	32%	8	negative
65	tubercle bacilli	60%	40%	4	negative
66	tubercle bacilli	65%	35%	1	negative
67	tubercle bacilli	83%	17%	5	negative
68	tubercle bacilli	82%	18%	3	negative
69	tubercle bacilli	92%	8%	1	negative
70	tubercle bacilli	70%	30%	3	negative
71	tubercle bacilli	76%	24%	4	negative
72	tubercle bacilli	82%	18%	5	negative
73	tubercle bacilli	92%	8%	5	negative
74	tubercle bacilli	64%	36%	7	negative
75	tubercle bacilli	92%	8%	1	negative
76	tubercle bacilli	60%	40%	6	negative
77	tubercle bacilli	64%	36%	1	negative
78	tubercle bacilli	69%	31%	5	reduction
79	tubercle bacilli	85%	15%	2	negative
80	tubercle bacilli	86%	14%	1	negative
81	tubercle bacilli	68%	32%	1	negative
82	tubercle bacilli	80%	20%	1	reduction
83	tubercle bacilli	55%	45%	5	reduction
84	tubercle bacilli	85%	15%	4	negative
85	tubercle bacilli	90%	10%	2	negative
86	tubercle bacilli	70%	30%	9	reduction
87	tubercle bacilli	blood	blood	6	negative
88	tubercle bacilli	99%	1%	1	negative
89	tubercle bacilli	50%	50%	7	negative
90	tubercle bacilli	79%	21%	3	negative
91	tubercle bacilli	blood	blood	1	negative
92	tubercle bacilli	63%	37%	1	reduction
93	tubercle bacilli	50%	50%	4	reduction
94	tubercle bacilli	55%	45%	6	reduction
95	tubercle bacilli	92%	8%	1	negative
96	tubercle bacilli	79%	21%	1	reduction
97	tubercle bacilli	87%	13%	4	negative
98	tubercle bacilli	50%	50%	1	negative
99	tubercle bacilli	blood	blood	1	reduction
100	tubercle bacilli	81%	19%	Alive after 10 days	reduction
101	tubercle bacilli	90%	10%	3	negative
102	tubercle bacilli	60%	40%	8	reduction

In this series the cultural results were negative; the amount of albumin varied from three to six mm.

The crosses represent the comparative number of mononuclear and polynuclear leucocytes.

The two negative cases were proved to be tuberculous by guinea-pig inoculation. One of these (No. 14) could justifiably be disregarded because the amount of fluid received at the laboratory was too small (4 c.c and 1 c.c. respectively) and too bloody to be of much use.

This glucose-like substance as found in normal cerebrospinal fluids is capable of reducing Fehling's copper solution, but leaves Nylan-

der's solution unaffected. It is incapable of undergoing fermentation and is ordinarily regarded as pyrocatechin.

Of more diagnostic value than any of the foregoing is the careful cytological examination of the fluid. For this purpose the centrifuge should be used and spreads made from the sediment. Here again, the presence of blood must be carefully avoided, since by its presence an artificial polynuclear leucocytosis is caused, which will make the result unreliable. A lack of attention to this point may account for the many discrepancies found in the literature.

Unfortunately we can formulate only general rules as to the significance of the cytological findings. At one time it was thought that the presence of many mononuclear leucocytes pointed positively to a tuberculous meningitis, and that the predominance of polynuclear leucocytes made the diagnosis that of a purulent meningitis. Thus Widal, to whom we owe much for the researches along this line, shows the relationship existing between the cytological picture and the etiology of meningitis, by reporting three tuberculous cases, all of which showed almost exclusively lymphocytes. Pfaundler makes the statement that "mononuclear leucocytes only occur in large numbers in tuberculous meningitis cases." But on looking over the further work done on this subject, we must regard these positive statements as erroneous, for acute tuberculous meningitis may show an increase of the polynuclear leucocytes, and chronic purulent meningitis may show the reverse. Marcon and Mutzner report an interesting case, in which the cerebrospinal fluid contained mainly polynuclear leucocytes, and yet the autopsy revealed a well-advanced tuberculous meningitis. As a general rule, however, it is true that a mononuclear leucocytosis goes with a tuberculous, and a polynuclear leucocytosis with a purulent meningitis. In the 102 fluids from cases of tuberculous meningitis tabulated in Table I., only three fluids proved exceptions to this general rule.

Nissl also finds a lymphocytosis in cases of syphilitic paraplegia. In thirty-seven cases examined, he found it present in every case but one. Gerhardt claims its presence also in cases of lues of the brain, and in tabes dorsalis. The number of fluids examined by the writer from such cases is too few to warrant any conclusions. Endothelial cells have occasionally been found in cases of tumor of the brain.

Cryoscopy has been found of no value.

The bacteriological findings are of paramount importance, giving us, when positive, an absolute diagnosis of the etiology of the disease. When negative we can draw no conclusions. Thus Stadelmann says: "Positive conclusions can only be drawn from positive, but never from negative results." The number of different organisms described as having caused meningitis is legion. Thus the *Staphylococcus albus* and *Staphylococcus aureus*, the streptococcus, the pneumococcus, the meningococcus, the typhoid bacillus, the *Bacterium coli*, the influenza

bacillus, the bacillus of Friedländer, the bacilli of glanders and plague, the tubercle bacillus and even the *Micrococcus tetragenus* and *Actinomyces bovis* have been credited as being the etiological factor of the disease. To this list can also be added the cases mentioned by Libman and Celler, in which the pseudo-influenza bacillus, the *Bacillus pyocyaneus*, and the *Bacillus proteus vulgaris* were isolated during life.

In the series of cases here reported the *Diplococcus intracellularis meningitidis* as first described by Weichselbaum in 1887, was the organism most often found, appearing in sixty-one per cent. of the cases due to inflammation of the meninges. For a description of its cultural characteristics, I would refer to the paper of Libman and Celler.

The tubercle bacillus was the second in frequency. In the 102 cases examined, tubercle bacilli were found in 100 (see Table I.) making a percentage of 98. This remarkable high percentage of positive results, we believe, is due purely to careful technic and to patience in looking for the bacilli. In more than one case it was necessary to search for several hours before the tubercle bacillus was found.

Technic and patience have much to do with the diverse results reported by different authors. Thus Monti, who examined thirty-five cerebrospinal fluids withdrawn from fifteen typical cases of tuberculous meningitis, failed to find the tubercle bacillus in any case, and therefore concludes that lumbar puncture furnishes no help in the diagnosis of tuberculous meningitis.

Other authors have also reported negative results, but the number of fluids examined was usually small. Thus Felsenthal, who examined one case of tuberculous meningitis, and Senator, who examined two, failed to find the tubercle bacillus. Ewald never succeeded in establishing the diagnosis in any of his cases, and Heubner also had negative results in the six or seven fluids examined. Kopp reports one positive finding in the three cases examined, while Stadelmann, who examined fourteen fluids, found tubercle bacilli three times.

As the number of fluids examined becomes greater, we notice a corresponding increase in the percentage of positive results which means that with more experience comes better technic. Thus Fürbringer found the tubercle bacillus in twenty-seven of the thirty-seven cases examined (seventy-three per cent.), and Bernheim and Moser reach the same percentage by having forty-four positive results in sixty cases (seventy-three per cent.). Slawyk and Manicatide found tubercle bacilli sixteen times in nineteen fluids (eighty-four per cent.), while Langer, who examined twenty-two fluids, had eighteen positive results (eighty-five per cent.). Pfaundler succeeded in demonstrating the tubercle bacillus in spreads, in nine out of his ten cases (ninety per cent.).

Several methods have been advocated to make the search easier and more successful. Lenhartz employed a small piece of absorbent cotton, which he allowed to sink slowly to the bottom of the fluid, hoping thereby to entangle any tubercle bacilli present. He would then lift it out with a platinum loop, tap it over a cover-glass, and stain for the bacilli. Slawyk and Manicatide used the fibrin net if present, and spread this on a cover-glass for use. If no fibrin net formed they centrifuged the fluid and employed the last few drops.

The author's technic in handling cerebrospinal fluids is as follows: As soon as the fluid is received at the laboratory, a culture is made of it on serum-agar and serum-bouillon, both with and without glucose. If a web of fibrin has formed, it is picked out with a sterile platinum loop and spread on an absolutely clean cover-glass until dry. This smear of fibrin acts as a nidus for the sediment obtained by means of the centrifuge. The fluid is then poured into a sterile centrifuge tube and centrifugalized for ten minutes. All but the last few drops is then poured off, the centrifuge tube refilled and this process is continued until all the fluid has been thoroughly centrifugalized. The centrifuge tube now contains a few drops of fluid holding all the elements thrown down. A platinum loop is introduced and the sediment thoroughly stirred up, scraping the bottom of the tube so as to free any tubercle bacilli which may be adhering to the glass. Then a drop of this fluid is placed on a clean cover-glass for cytodiagnosis, and the remainder is poured over the film of fibrin previously prepared, and placed in the thermostat to dry. This concentration of material on one specimen is much to be preferred to the method advised by some authors, notably Pfaundler, who hunts through ten to twenty spreads from each cerebrospinal fluid. In one or two hours the specimen has thoroughly dried, and after passing it three times through the flame, is stained by the Ziehl-Neelsen method.

The necessity of having absolutely clean cover-glasses for this work is exemplified by a case reported by Fürbringer, in which he found tubercle bacilli in the cerebrospinal fluid and at the post-mortem an advanced typhoid fever was discovered. He thinks that possibly the cover-glass used had been previously employed for staining a tuberculous sputum.

The decanted fluid is then tested as to its reaction, specific gravity, presence of albumin, sugar, etc.

It would be manifestly unfair to quote the statistics of different authors on tuberculous fluids without, at the same time, noting at what stage of the disease the lumbar punctures had been made, for the nearer the agonal period the fluid is withdrawn, the higher the percentage of positive results should be. Most of the cases of Slawyk and Manicatide were punctured during the last three days of life,

one case, however, showed tubercle bacilli on the seventh, and one on the ninth day before death. Langer's fluids, as a rule, were withdrawn somewhat earlier in the disease, ranging between the first and sixth day before exitus. The writer's cases were as follows:

33 cases showed tubercle bacilli 1 day before death.
15 cases showed tubercle bacilli 2 days before death.
13 cases showed tubercle bacilli 3 days before death.
10 cases showed tubercle bacilli 4 days before death.
8 cases showed tubercle bacilli 5 days before death.
5 cases showed tubercle bacilli 6 days before death.
4 cases showed tubercle bacilli 7 days before death.
6 cases showed tubercle bacilli 8 days before death.
3 cases showed tubercle bacilli 9 days before death.
1 case showed tubercle bacilli 10 days before death.
1 case showed tubercle bacilli 12 days before death.
1 case still alive, having shown tubercle bacilli 11 days ago.

The possibility of growing the tubercle bacillus, in cases where a microscopical examination has proved negative, has been strongly advocated by Langer, who states that in every one of his cases, he succeeded in cultivating the bacillus in the cerebrospinal fluid. By this means he diagnosed 100 per cent. of his cases. Unfortunately, we meet with the same objection here, as we do to the inoculation of

TABLE II.—STREPTOCOCCUS CASES.

No.	Albumin	Microscopic	Culture	Cytology	
				Mononuclear Leucocytes	Polynuclear eucocytes
1	4 mm.	streptococcus	streptococcus	+	++++
2	4 mm.	staphylococcus	staphylococcus	+	++++
	4 mm.	staphylococcus	streptococcus	+	++++
3	4 mm.	streptococcus	streptococcus	++	+
4	4 mm.	streptococcus	streptococcus	+	++++
	.....	negative	negative	bloody	+
	4 mm.	negative	negative	+	++++
5	6 mm.	streptococcus	streptococcus	+	++++
6	4 mm.	streptococcus	streptococcus	+	bloody
7	6 mm.	streptococcus	streptococcus	10%	90%
8	3 mm.	streptococcus	streptococcus	11%	89%
9	4 mm.	streptococcus	streptococcus	17%	83%
10	4 mm.	streptococcus	streptococcus	17%	83%
11	4 mm.	streptococcus	streptococcus	4%	96%
12	5 mm.	streptococcus	streptococcus	4%	96%
13	6 mm.	streptococcus	streptococcus	17%	83%
14	5 mm.	streptococcus	streptococcus	8%	92%
15	5 mm.	streptococcus	streptococcus	6%	94%
16	5 mm.	streptococcus	streptococcus	2%	98%

the fluid into guinea-pigs—the patient is long dead before the diagnosis is obtainable. For even under the most favorable circumstances, the cultivation of the tubercle bacillus takes four weeks. It is true that this method is easier and cheaper than the use of guinea-pigs, but it is not as sure. Slawyk and Manicatide tried to cultivate the bacillus in all of their 19 positive fluids, and only succeeded in three cases. The writer's experiences along this line are too few to allow of any expression of opinion further than to say that he sees no advantage in cultivation over inoculation, since time is hardly saved thereby.

That the subcutaneous or intraperitoneal inoculation of the cerebrospinal fluid into guinea-pigs is absolutely reliable, is accepted by most pathologists, but 5 c.c. or more should be injected, and four to six weeks allowed to elapse before the animal is killed. Marfan reported a case in which he injected less than 4 c.c., with negative result and yet the autopsy showed the presence of a tuberculous meningitis. Our results, even when the amount of fluid sent to the laboratory was so small that we had to content ourselves with the injection of only one or two cubic centimeters, were uniformly good.

TABLE III.—PNEUMOCOCCUS CASES.

No.	Albumin	Microscopic	Culture	Cytology	
				Mononuclear Leucocyte	Polynuclear Leucocyt s
1	.....	pneumococcus	pneumococcus	+	+++
2	4 mm.	pneumococcus	pneumococcus	+++	+
3	3 mm.	pneumococcus	pneumococcus	5%	95%
4	5 mm.	pneumococcus	pneumococcus	15%	85%

Sugar negative.

One possibility still remains of overcoming the objectionable time-limit in the use of the guinea-pig. It has been suggested that we employ the tuberculin reaction for an early diagnosis. After the animal is injected with the suspected cerebrospinal fluid, and subsequently with tuberculin, will the thermometer give us a clue? This question the writer hopes to investigate in the near future.

As a possible additional help in the diagnosis of tuberculous cerebrospinal meningitis, Donath tried microscopic agglutination tests, using an emulsion of tubercle bacilli, against which he tested the cerebrospinal fluid. He found the agglutinative power very low, none being positive even in dilutions of 1:10, while in a case of epidemic cerebrospinal meningitis, he obtained a partial reaction. His own conclusions are that this method is not reliable.

In connection with the question of agglutination it may be of

interest to note the results obtained by the writer in seven cases of typhoid fever, in which he tested the cerebrospinal fluid against the Eberth bacillus. Although the blood of both cases showed a positive Widal reaction in dilutions of 1:50, yet the cerebrospinal fluid gave absolutely no reaction even as low as 1:5.

TABLE IV.

No.	Albumin	Microscopic	Culture	Cytology	
				Mononuclear Leucocytes	Polynuclear Leucocytes
1	5 mm.	streptococcus mucosus	streptococcus mucosus	2%	98% .....
2	3 mm.	streptococcus mucosus	streptococcus mucosus	4%	96% .....
1	4 mm.	influenza	influenza	11%	89%
2	4 mm.	influenza	influenza	1%	99%
1	3 mm.	bact. coli	bact. coli	19%	81%
	blood	bact. coli	bact. coli	blood	blood
	2 mm.	bact. coli	bact. coli	26%	74%
	2 mm.	bact. coli	bact. coli	29%	21%

Regarding the prognosis of tuberculous meningitis we must be rather conservative. Until a few years ago it was regarded as absolutely fatal, but in the recent literature we find four rather convincing reports of cases cured. Schaeche, who seems to have overlooked Freyhan's, as well as Henkel's cases, makes the statement as recently as 1901, that no single case of so-called healed tuberculous meningitis, showed tubercle bacilli in the lumbar puncture fluid. He further says that even if a case looks like tuberculous meningitis, and goes on to recovery, we are forced to change our diagnosis to that of serous meningitis, as tuberculous meningitis is always fatal.

Freyhan, who reported the first case of recovery, cannot be questioned as to the correctness of his diagnosis. His patient had typical symptoms of tuberculous meningitis, and tubercle bacilli were found in each of two different lumbar puncture fluids. The patient, after several months, made a perfect recovery. Henkel reported the second case on record in 1900. His patient was a boy ten years old, in whose cerebrospinal fluid tubercle bacilli were found, and yet the case recovered. Barth, in 1902, reported the recovery of a child two and three-fourths years of age, in whose lumbar puncture fluid tubercle bacilli had been found. Lastly, Gross in the same year, reported a case in which three lumbar punctures had been made, the first showing tubercle bacilli and the other two being negative, and yet the case

went on to recovery. These four are the only apparently authentic non-fatal cases of tuberculous meningitis in the literature. All of the 102 cases referred to in this paper terminated fatally.

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REPORT OF TWO CASES OF TUBERCULOSIS OF THE OVARY.*

FROM THE PATHOLOGICAL INSTITUTE OF PROFESSOR CHIARI, IN PRAG.

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Although within recent years a gradually increasing number of cases of tuberculosis of the ovary has been reported, tuberculosis affecting secondarily a cystadenoma of this organ is still among the rarities of pathology. Under the latter heading comes the case that forms the basis of the first part of this article.

Case I.—Marie C., aged seventy-two years, was admitted to the Jewish General Hospital in Prag in September, 1903. She had been repeatedly treated in this institution for cardiac palpitation and dyspnea that were most marked upon exertion. At the time of admission, shortly before death, she was again suffering from these symptoms. Edema of the lower extremities had been present during the two weeks preceding. The following is a brief abstract of the condition upon admission: There is very marked anasarca with free fluid in all the large body cavities. Hypertrophy of the left ventricle of the heart, accentuation of the second aortic sound. Lungs and abdominal viscera normal. In the pelvis a cystic tumor the size of a child's head, not tender to palpation, and apparently arising from the left ovary, can be detected. Under treatment the anasarca gradually decreased, but death from progressive inanition occurred on October 5, 1903. Clinical diagnosis: Chronic nephritis, myocarditis, cyst of left ovary. For the history of this case I am indebted to Dr. Saar, resident physician of the hospital. The autopsy, of which a report follows, was performed on October 6. The body is 165 cm. long, very emaciated. Marked anemia of the skin and visible mucous membranes. Abdomen retracted. External genitals normal. Thyroid slightly enlarged and shows colloid degeneration. Lungs not adherent. In the apices are cicatrices and old tubercular foci. Both lungs are thickly studded with miliary tubercles. Peribronchial lymph-nodes show caseous degeneration. Pericardium totally adherent to heart. The cardiac valves as well as the intima of the

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aorta show here and there yellow lines in the aorta; there are also nodular elevations. In the lower third of the esophagus are two small traction diverticula. The liver is markedly fatty, and, as well as the spleen and kidneys, shows numerous miliary nodules. The abdomen has no abnormal contents. In the lower part of the small intestine is a moderate number of small, discrete, tubercular ulcers. The gall-bladder contains dark bile. Upon its fundus is a nodule the size of a hen's egg, showing caseous degeneration.

In the uterus are three small, broad sessile polyps. The left adnexa are normal. The right ovary is transformed into a flaccid cyst the size of a man's head, and is filled with cloudy, serous fluid. The right tube stretches over the cyst and is much elongated. The inner surface of the cyst is covered with a yellowish deposit and shows numerous miliary nodules. Similar nodules are present on the peritoneum covering the cyst and lining Douglas's cul-de-sac and in the mucous membrane of the right tube. Autopsy diagnosis: General miliary tuberculosis; chronic tuberculosis of the pulmonary apices and peribronchial lymph nodes, and of a lymph node in the neighborhood of the gall-bladder; tubercular ulcers of small intestine. Adherent pericardium; general hypertrophy of the heart; chronic deforming endarteritis. Traction diverticula of the esophagus. Fatty infiltration of the liver. Adenocystoma of the right ovary with tuberculosis of cyst wall and of right Fallopian tube; mucous polypi of uterus. Description of cyst, museum No. 5854: The right ovary presents itself as an oval cyst 16x19 cm., in which ovarian tissue cannot be macroscopically recognized. It is firmly bound by adhesions to the right Fallopian tube and to the right side of the uterus. Its surface is uneven, covered with old and fresh adhesions, and shows a few scattered, greyish-white nodules about the size of a pin's head. Upon its internal surface is a uniform, yellowish, caseous deposit that can be readily scraped off, disclosing a smooth cyst wall over which run many small blood-vessels. This surface is also uneven, and shows numerous yellowish-white miliary tubercles, which are for the most part discrete, but here and there arranged in groups. At the lower pole of the cyst three daughter cysts project into the large cavity, although not communicating with it. Each of these secondary cysts is as large as an English walnut; the walls are smooth, showing neither the tubercles nor the caseous deposit found in the large cavity. The right Fallopian tube is markedly elongated, measuring 39 cm.; its lumen, which is patent in its distal portion to within 10 cm. of its entrance into the cavum uteri, is not dilated. The tube curves over the anterior surface and upper pole of the ovarian tumor and then lies posterior to it, the fimbriated extremity

lying on a level with the uterine cervix. In its proximal third the tube and ovary are firmly adherent to one another. The mucous membrane of the tube is injected and its folds contain many greyish-white miliary nodules.

The uterus is displaced to the left. The body measures 4 cm.; its cavity is not dilated. Upon the posterior wall immediately above the internal os, a sessile tumor, 1 cm. in diameter, projects into the lumen; two slightly smaller and similar tumors lie above it and to the left. The cervix is dilated, its almost circular cavity measuring 2½ cm. in diameter. It contains a small amount of mucus. In neither cervix nor body of uterus can tubercles be macroscopically demonstrated. From the peritoneal surface of the fundus a tumor the size of a pea projects into the peritoneal cavity. The peritoneum of the pelvic cavity shows numerous miliary nodules. Histological examination of the pelvic organs gave the following results: The inner surface of the large cyst shows a uniform, necrotic, structureless layer beneath which is a narrow zone of small, round-celled infiltration in which lie many typical miliary tubercles with giant cells. Between the necrotic mass and the zone of infiltration a single layer of flattened epithelial cells with elongated nuclei is preserved. Corresponding with the projections on the inner wall of the cyst are numerous microscopic cysts lined by a continuous layer of low cuboidal epithelium. External to the zone of tubercles is a broad band of dense connective tissue containing very few cells, the latter becoming more numerous toward the peritoneal surface. The peritoneum is thickened and contains a few young miliary tubercles without giant cells. The daughter cysts show the same structure as the microscopic cysts already described. Remains of ovarian tissue are sparingly present. The mucous membrane of the right Fallopian tube is everywhere thickly infiltrated with small round cells, and also shows miliary tubercles. The muscular coats are normal. The peritoneum of the recto-uterine pouch is thickened and contains a few miliary tubercles. Neither cervix nor body of uterus shows any evidence of tuberculosis. The tumors within the cavity of the uterus show the ordinary structure of uterine polypi; that upon the fundus is a myoma.

Tubercle bacilli in small numbers can be demonstrated wherever miliary tubercles are found.

This case, therefore, is undoubtedly a tubercular infection of an ovarian cyst. A considerable number of such cases have been reported. From previous articles and from the literature I have been able to collect the following cases, 19 in all: Krzywicki,[1] Edmunds,[2] Heiberg,[3] Klebs,[4] Sturges,[5] Schottlænder (2 cases),[6] Sänger,[7] Gade,[8]

Madlener,[9] Ohlshausen,[10] Grusdew,[11] Baumgarten,[12] Kelly,[13] Prüsman,[14] Wechsberg,[15] Elsæsser,[16] Griffiths,[17] Wells.[18]

A more critical review of these cases demonstrates that this complication is rarer than the above figures would seem to indicate. Madlener has divided the tubercular cysts of the ovary into (*a*) those in which a cyst adenoma of the ovary has become secondarily infected, and (*b*) those that represent large cysts occurring as the result of caseous degeneration of a tubercular focus. The caseous mass constantly increases and the encapsulating ovarian tissue is in consequence distended. It is to the latter class, not true ovarian cysts, that some of the above-cited cases belong. Such are the cases of Madlener, Griffiths and Heiberg. Of the remaining cases, Krzywicki himself suggests that his case was one of encapsulated peritonitis, while Grusdew leaves it undecided whether his case was also of this nature or a true adenocystoma of the ovary. The reports of Edmunds and Sturges are too incomplete to admit of their classification under either of Madlener's two groups.

A final point of interest lies in the mode of infection. Direct infection through puncture is attributed as the cause in Sänger's case. While undoubtedly most cases of ovarian tuberculosis have been associated with, and secondary to tuberculosis of the peritoneum or Fallopian tubes, the theory of the hematogenous mode of infection is now generally accepted. In our case we believe the infection to have occurred through the blood channels despite the associated tuberculosis of the peritoneum and tube. The presence of an acute general miliary tuberculosis, the uniform stage at which the process was found in the cyst, tube and peritoneum, the absence of evidence of an old, general tubercular peritonitis,—all these facts lend support to the theory of the involvement of the cyst as a part of a general infection through the blood, the primary focus lying in the chronic tubercular process in the lungs or lymph nodes.

Case II.—Tuberculosis of the left ovary; tubercular peritonitis; perforation into the intestine with secondary fetid peritonitis; death.

Marie K., thirty-four years old, a widow, was admitted to the clinic of Professor von Franqué in the General Hospital in Prag, September 24, 1903. Her family history is negative. Her husband died of tuberculosis. Three years before admission the patient had had an attack of what she describes as peritonitis and pneumonia. Two

years ago she had had typhoid fever. Menstruation began in the seventeenth year; has always been regular; no dysmenorrhea. Last menstruation August 20, 1903. She has given birth to four children, two of which have since died of scarlet fever. The last child was born four years ago. She aborted once. All the deliveries have been difficult, and the first two or three days of each puerperium have been associated with fever. Alcoholism and syphilis are denied. Since the last puerperium the patient has suffered from fever, diarrhea, increasing emaciation and weakness. She attributes her illness to having lifted a heavy weight shortly after the parturition, the result being some pelvic injury. For the past five weeks she has experienced severe pain in both sides of the pelvis; during the past two weeks this pain has become more intense. There have been diarrhea and dysuria. No vaginal discharge.

Physical Examination.—The patient is large, but slender. Panniculus adiposus moderate. Skin and pupils normal. At the right pulmonary apex there are dulness and a few subcrepitant râles. Otherwise the thoracic viscera are normal. The abdomen is distended. The liver and spleen are not enlarged. In the median line there is dulness from the symphysis pubis to three finger-breadths below the umbilicus. The abdomen is tender to percussion. The external genitals are those of a multipara. There is no vaginal or urethral discharge. The external os shows a stellate laceration, and a cystocele and rectocele are present. The vaginal portion lies upon a level with the upper border of the symphysis, against which it presses. It is moderately large, slightly dilated, and movable. The body of the uterus lies anterior; it is moderately large, and immovable. Posterior to the uterus and somewhat to the right a resistance varying in consistency is encountered. There is a bulging of the posterior vaginal fornix. The resisting mass is in part cystic, and extends to three fingers above the posterior commissure. To the left of the uterus, reaching laterally to the pelvic wall and upwards to a hand's breadth above Poupart's ligament, a mass of doughy consistence, tender on prpessure, is palpable. No distinct tumor is palpable.

On September 26, 1903, a puncture was made in the mass in the posterior vaginal fornix, and clear fluid was drawn off. While in this clinic, as well as in that of Professor Pribram, to which she was later transferred, the diarrhea and dysuria continued. There were cough, fever, abdominal distention and tenderness. Emaciation was progressive. In the vaginal secretion no tubercle bacilli could be found. January 7, 1904, the patient voluntarily left the hospital, the pelvic condition having remained unchanged throughout. Two weeks later she was admitted to the clinic of Professor von

Jaksch. The abdominal pains had become more severe. For five days there had been vomiting and constipation. The abdomen was extremely tender and painful, and markedly distended. Emaciation was extreme. No examination was made on account of the exquisite pain caused by even the slightest movement. Death on February 3, 1904, after symptoms of progressive inanition.

Clinical Diagnosis.—Pulmonary tuberculosis; tubercular peritonitis; tuberculosis of genitals. Summary of autopsy report: The body is 165 cm. long, poorly developed, and very emaciated. Pallor of skin and visible mucous membranes. Abdomen distended and slightly tense. The cervical organs are anemic, but otherwise normal. The right lung is totally adherent, very anemic, not edematous. At the apex is a circumscribed cicatrix. The left lung is free; it is also anemic, and shows distinct acute edema. There are old cicatrices at the apex. The foramen ovale of the heart opens obliquely, the aperture measuring three mm. in diameter. Otherwise the heart as well as the pericardium and intima of the aorta is normal. The peribronchial lymph-nodes are anthracotic, but not otherwise pathological.

In the lower part of the abdominal cavity are about two liters of a fetid, purulent exudate containing yellowish-white flakes agglutinated into masses the size of a hen's egg. The peritoneum is thickened and ulcerated in many places behind the exudate. The liver is steatotic and anemic. All the abdominal viscera are firmly adherent to the peritoneum and to the neighboring organs. The spleen, kidneys, adrenals and pancreas are anemic, but not pathologically changed otherwise. The uterus is markedly retroflexed, the fundus being adherent to the posterior wall of Douglas's cul-de-sac. The right adnexa are firmly adherent to one another and to the surrounding tissues. The right tube contains scanty mucus. Its mucous membrane is thickened and yellow in color. The left adnexa are similarly adherent. The tube contains thick pus. The left ovary is enlarged to the size of a hen's egg and contains many small abscesses, some of which are as large as a hazelnut. Some of the larger abscesses have already broken through the surface of the ovary. The mucous membrane of the uterus is pale; the walls of the blood-vessels are thickened. In the left half of the fundus is a subserous myoma the size of a bean. The vaginal mucous membrane is smooth.

On the posterior wall of the recto-uterine pouch there are large ulcerations of the peritoneum. In the ulcerated area there are two perforations through which the large intestine communicates with the recto-uterine pouch. One of these perforations is situated in the anterior wall of the rectum 11 cm. above the anus, while the

second occurs at the middle of the sigmoid flexure where this loop is bent upon itself and is firmly adherent to the left ovary. Each perforation measures about 4 mm. in diameter. The mucous membrane of the intestine is pale, the only signs of inflammation being found in the immediate neighborhood of the perforations into the rectum and sigmoid flexure. The appendix vermiformis is firmly bound down by adhesions, and is twice bent upon itself. Its walls are normal.

Autopsy Diagnosis.—Chronic suppurative inflammation of the left Fallopian tube. Multiple abscesses of the left ovary. Ulcerative peritonitis with perforation into the sigmoid flexure and rectum. Quiescent tuberculosis of the pulmonary apices. Patent foramen ovale. Myoma uteri. Marasmus and anemia.

In the pus from the abscesses in the left ovary many bacteria of different varieties, together with a few tubercle bacilli were found.

Description of specimen (museum No. 5485). The left ovary measures 6x4 cm. It is displaced posteriorly in the recto-uterine pouch; to the walls of the latter as well as to the surrounding parametral tissues it is firmly adherent. The central portion of the organ is replaced by an abscess cavity the size of a walnut, containing thick pus. In the remaining ovarian tissue are numerous smaller abscess cavities, of which some are as large as a hazelnut. Many of these abscesses are superficial; two have already perforated into the pelvic cavity. The left Fallopian tube is markedly thickened, especially at its fimbriated end. It is elongated, measuring 9.5 cm., and, like the ovary, is firmly adherent to the surrounding tissues. Its outline is tortuous, the organ being bent upon itself at its midpoint so as to produce a constriction. It contains thick pus. The right ovary is but slightly enlarged. It is adherent to the peritoneum covering the posterior wall of the pelvis. Its cut section is normal. The right Fallopian tube is adherent to the corresponding ovary except at its fimbriated end. It measures 6 cm. in length; its walls are thickened; its lumen contains a small amount of mucus; the mucous membrane is yellow. The uterus is extremely retroflexed, but not enlarged. From the left half of the fundus a small pea-shaped tumor projects beneath the peritoneum.

For microscopic purposes pieces were cut from the adnexa of both sides, and from the rectum and sigmoid flexure at the respective sites of perforation. The sections from the left ovary show an almost complete replacement of the tissue of that organ by tubercle tissue. Large areas of caseous degeneration are surrounded by a zone of round cell infiltration in which are innumerable miliary tubercles containing giant cells in large numbers. The mucous membrane of the left tube is entirely destroyed, the much-thickened wall showing

a structure identical with that seen in the ovary. In both organs tubercle bacilli in considerable numbers can readily be demonstrated, lying either free in the tissues or enclosed within the bodies of the cells. Of these the multinucleated cells are especially affected. One such cell contains three bacilli, one lying at the center, and two among the peripherally-situated nuclei. The right ovary is normal. The mucous membrane of the right tube contains many miliary tubercles with giant cells.

The sections taken through the site of perforation in the sigmoid flexure show the following changes: The immediate wall of the opening is formed by a broad zone of necrotic, granular tissue that extends from mucous membrane to peritoneum. Beneath this the entire thickness of the wall is densely infiltrated with small round cells. This infiltration extends a short distance on all sides of the perforation beneath the mucous membrane. In it, but only in the immediate neighborhood of the perforation, a few miliary tubercles are seen. Here also tubercle bacilli, but in very small numbers, were found. The pathological changes about the perforation in the rectum are of a chronic inflammatory nature, and no evidences of tuberculosis can be demonstrated.

From both a pathological and clinical standpoint this case presents several features of interest. The sequence of events would seem to have been as follows: (1) a secondary tuberculosis of the left ovary and tube associated with tubercular peritonitis; (2) a continuation of the tubercular process through the wall of the sigmoid flexure at the point where it was bound by adhesions directly to the surface of the affected ovary; (3) as a result of this involvement of the intestine by contiguity, a perforation of its wall causing a fetid, ulcerative peritonitis from the escape of intestinal contents; (4) finally a secondary perforation of the rectum through the ulcerative peritonitis.

As to the mode of infection of the ovary, two sources may be considered. The old tubercular foci gave rise to the infection through the blood, the process subsequently extending to the adjacent tissues. This explanation seems the more probable. The hematogenous infection, as has been pointed out among others by Amann[19] and Williams,[20] is probably of far greater frequency than is commonly believed. The latter author groups under the title of "unsuspected" cases a series of cases of acute general miliary

tuberculosis in which tubercle bacilli were demonstrated in the ovaries without macroscopic changes. On the other hand, the possibility of the infection in our case having taken place through the vagina must not be overlooked. Altherthun[21] states that the puerperium renders the vaginal infection more easy, and from the history it would seem that the symptoms first appeared shortly after the last parturition. This fact, together with the quiescence of the pulmonary process and the absence of phthisis elsewhere, makes it impossible to exclude with certainity this mode of infection.

That the infection of the pelvic organs was secondary to intestinal tuberculosis is highly improbable. At only one point, the site of perforation in the sigmoid flexure, was there any evidence of intestinal tuberculosis, and here the preservation of the mucous membrane intact about the perforation, and the more advanced stage of the process upon the peritoneal surface point unquestionably to the invasion of the intestinal wall from the peritoneum inward. Finally the entire absence of evidences of tuberculosis about the rectal perforation leads to the conclusion that this perforation is secondary to the ulcerative peritonitis.

From a study of the macroscopic specimen the diagnosis of suppurative oöphoritis and salpingitis alone could be made a feature to be especially emphasized. There were no tubercles upon the peritoneum, and the tubercular process in the ovary presented the more common type of diffuse suppuration without macroscopic tubercles. The difficulty of differentiating between tubercular and non-tubercular salpingitis has been pointed out by Von Franqué.[22] The same similarity between the two processes obtains in the ovary, and it is probably owing to this resemblance that many tubercular cases that are not examined microscopically are improperly classified.

A case in its important features closely resembling that just described is here briefly summarized. The woman was a patient in the gynecological service of Professor von Franqué. The case presented, upon autopsy, tubercular foci in the pulmonary apices and in the peribronchial lymph-nodes. The recto-uterine and utero-vesical pouches were completely shut off from the main abdominal cavity by adhesions. They formed together a suppurating cavity; the two pouches communicating over the left horn of the uterus.

The adnexa formed a part of the lateral walls of the abscess cavity, the ovaries being almost entirely replaced by a tubercular tissue. Microscopically, the adnexa of both sides showed typical miliary tubercle containing giant cells and tubercle bacilli. There were perforations into the rectum, sigmoid flexure and urinary bladder. The perforations into the intestine, as in the last case, were secondary to a tubercular peritonitis, and a fetid peritonitis then resulted from the escape of intestinal contents. The perforation into the bladder was due to the secondary peritonitis. No pathological changes except edema of the left half of the organ were present in the wall.

In this case also the diagnosis of suppurative oöphoritis and salpingitis was made at the time of autopsy, and the tubercular nature of the infection was first revealed by the microscopic examination.

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A NEW METHOD FOR STAINING THE CAPSULES OF BACTERIA; BEING ALSO A CONTRIBUTION TO THE MORPHOLOGY AND DIFFERENTIATION OF SOME ENCAPSULATED ORGANISMS.

By Leo Buerger, M.D.

The morphological identification of bacteria has of late years played a subsidiary role in bacteriological diagnosis. The continual discovery of new organisms with structures apparently identical with some of the forms already known, has made cultural and biological tests of more importance in differentiation. There are, however, groups of bacteria which can be identified with a fair degree of certainty by their morphology alone. For the recognition of pneumococcus considerable reliance must at times be placed upon the demonstration of a capsule. In a preliminary communication, published December 10, 1904 (*Medical News*, New York, Vol. 85, p. 1117), I gave, in brief, a method for staining the capsules of bacteria. It shall be the purpose of this paper not only to describe the method, but also to make mention of those points in the morphology of some of the encapsulated organisms which are brought out by the employment of the technic and which may be of interest in a diagnostic way. I shall, therefore, divide my subject matter into the following:

A—The Method.

B—Morphology, with a reference to the diagnosis and differentiation of some encapsulated organisms.

I.—THE METHOD.

In the description of the method, I shall follow this order:

1. Necessary solutions.
2. Technic.
3. Analysis of the method, and variations in the technic.

1. *Necessary Solutions.*—(1) Beef, human or other blood serum diluted with an equal amount of normal salt solution; or ascitic, or pleural fluid. (2) The fixing solution: Müller's fluid (bichromate of potassium, 2.5 grams; sulphate of sodium, 1.0 gram; water, 100 c.c.) saturated with bichloride of mercury (ordinarily about 5 per cent.). (3) 80 to 95 per cent. alcohol. (4) Tincture of iodine (7 per cent.). (5) Freshly prepared stain; anilin water gentian violet, made up as follows: Anilin oil 10, water 100, shake, filter and add 5 c.c. of a saturated alcoholic solution of gentian violet; or, 10 per cent. watery fuchsin (i.e., saturated alcoholic solution of fuchsin, 10 c.c., water, 90 c.c.). (6) Two per cent. watery sodium chloride solution.

2. *Technic.*—In this description, I purpose giving the method as ordinarily carried out for the examination of cultures, reserving the discussion of variations for later consideration.

A small portion of the culture is mixed with a drop of serum upon a perfectly clean cover-slip, and then thinly and carefully spread in the usual way. Before drying is complete (when perhaps one-half dry), a quantity of the fixing fluid, solution No. 2, sufficient to cover the specimen is poured on and the cover-slip gently warmed over the flame for about three seconds. It is then rapidly washed with running water, flushed once with alcohol, and then treated with the iodine for about one minute. The latter is in turn washed off several times with alcohol (till the alcohol remains clear) and the specimen is dried in the air. Staining with the gentian violet solution for about three seconds, washing, and mounting in salt solution completes the procedure. Before examination, the specimen may be ringed with vaseline.

The steps may be briefly summarized as follows: (1) Spreading in serum. (2) Fixation. (3) Washing in water, then alcohol. (4) Iodine. (5) Washing in alcohol; drying. (6) Staining. (7) Mounting.

3. *Analysis of the Steps in the Technic and Variations in the Mode of Procedure.*—A brief consideration of the technic makes it evident that the method represents very little more than the application of simple histological technic to the staining of bacteria. The failure to demonstrate the capsules of many organisms in culture media has been due in great part to the employment of water for

spreading the films. Water breaks up the capsules of most of the encapsulated bacteria. Hiss[1] has called attention to the value of the use of serum for this purpose. In my work, beef serum diluted with an equal part of normal salt solution has been found an efficient medium. Certain apparent exceptions to this will be mentioned later on. Keeping in mind the delicate structure of the capsules, it is important in general to carry out the process of spreading in a rather careful manner, at all times keeping the culture submerged in the serous fluid.

The fixing fluid, Zenker minus acetic acid, takes the place of heat. It fixes not only the bodies of the bacteria, but also their envelopes. When added just before drying is complete, it is efficacious in preventing the formation of a diffusely staining layer of serum upon the cover-slip. Thus the final picture can be made a clear one, the background remaining either absolutely clear, or perhaps marred here and there by some detritus. The slight warming over the flame may accelerate the action of the fixing fluid. The necessity for obtaining a rather rapid effect is due to the contracting or shrinking influence of the fixative, when it is allowed to act for a long time. Even as it is, this cannot be wholly avoided.

The specimen is freed from the fixing fluid by the washing in water, and the treatment with iodine. The preliminary flushing with alcohol before the iodine step facilitates the action of the latter, but is not essential. Just as in the management of histological sections of tissues fixed in sublimate or Zenker's fluid, the bichloride must be freed from the specimen by means of iodine. Without its use, the field is spotted everywhere with black granules, all of which disappear when treated as mentioned above,

The iodine is then washed off with alcohol; in this step, it is of importance to extract all of the tincture so as to prevent any residuum from combining with the staining fluid. The whole process, up to the drying of the specimen in the air, must be regarded as preparatory. It makes possible the employment of the various stains to be mentioned further on. Salt solution has been selected for the washing and mounting, because it gives the clearest and best pictures.

The method may be varied in certain details without marring the final result to any great extent. As examples may be mentioned the

failure to warm the specimen, the discarding of the preliminary alcohol before the iodine. However, when one studies a number of encapsulated organisms, both in exudates and on various artificial media, one will note that certain modifications in technic are requisite for the attainment of the best results. These depend on the particular bacterium in hand and upon the medium from which it is taken. I shall briefly refer to these points under the discussion of the separate organisms.

As already mentioned, beef serum diluted with an equal volume of normal salt solution is generally to be employed. When the serum is thin, or when we wish to demonstrate the presence of capsules in fluid media, it is often better to use it undiluted. Pleuritic serum and ascitic, when their albumen content is sufficiently high, also answer the purpose. As a rule they require no dilution. When one considers the comparative ease with which the capsules of the pneumococcus can be stained in certain exudates, it is not surprising to note that some of these serve admirably as diluent and spreading fluids. Thus one of the best of these is the sterile, almost clear supernatant fluid, obtained when old sero-purulent empyema exudates are allowed to stand for some time.

The Zenker's fluid without acetic acid has given me the best results. In my experiments with saturated bichloride of mercury in one-half per cent. sodium-chloride solution almost equally good pictures were obtained. Other fixatives, such as formalin and Fleming's fluid, were discarded because they failed to give a clear field, and possessed no advantages over the solution recommended. When Zenker, with the usual amount of acid, was tried on cultures of the pneumococcus, it was found that many capsules were swollen, others were poorly stained, and still others were broken down completely. Controls without the use of the acid were much superior. The experiments with various stains were of some interest. They showed that the capsules of certain bacteria would allow of considerable manipulation, when fixed as described. Furthermore, certain differential methods of staining, to be noted later on, were developed.

The weak anilin water gentian violet was found to be the most useful stain. Although the ordinary solution, generally in use for the Gram method, can be employed, it has a tendency to overstain

the specimen. A strong fuchsin stain (10 to 15 per cent., 10-15 c.c. of a saturated alcoholic fuchsin solution, water up to 100 c.c.) possesses this advantage, that it need not be made up fresh. The anilin water stains ought to be freshly prepared. Methylene blue lacks the intensity requisite for clear definition and the same is true of methyl-green-pyronin (Pappenheim). The latter stains the body of the pneumococcus red, and the capsule a faint green.

An important and useful variation in the method of staining is the application of the *Gram procedure*. It is carried out in the following manner: After the alcohol wash and drying, the specimen is stained by the usual Gram method, counter-stained for a minute in a strong aqueous fuchsin solution (10 to 15 per cent.), washed and mounted in water. All capsules will decolorize and take on the counter-stain; the body of the pneumococcus holds the stain. The necessity and practical utility for such a procedure was first called to my attention when I noted the similarity of some of the small diplococcoid forms of the Friedlaender bacillus and the pneumococcus in mixed cultures.

Culture made directly from throats, by inoculating material from a swab upon a tube of Loeffler's blood-serum medium, often shows the presence of encapsulated diplococcus forms which can only be morphologically differentiated in this way. The combined "capsule and Gram" method makes the identification easy.

The best capsular outlines and most satisfactory pictures are those obtained by mounting in fluid media. Salt solution is to be employed for the gentian violet stain, and water for the fuchsin and Gram methods. The use of balsam seems to destroy the definite outline of the capsules and causes a certain amount of diffusion of the stain. The ordinary specimens can, however, be converted into fairly good permanent ones by flushing off the salt water with a 5 to 10 per cent. watery potassium ferrocyanide solution, drying with blotting paper and mounting in balsam.

As far as I have been able to ascertain, the method above described can be applied to the staining of all the ordinary encapsulated organisms, both in exudates and in culture. Certain characteristic differences in morphology are clearly demonstrated. These will be referred to under the description of the separate organisms.

II.—MORPHOLOGY; WITH A REFERENCE TO THE DIAGNOSIS AND DIFFERENTIATION OF SOME ENCAPSULATED ORGANISMS.

The Pneumococcus.—It shall be the object of the following to give a brief review of the study of the morphology of the pneumococcus under varied conditions. The presence, genesis and significance of the capsule of this organism have given rise to considerable controversy. Thus in 1885 Sée[2] was of the opinion that it was merely an artefact. The employment of staining methods, such as Welch's, made it evident that the possession of this envelope was characteristic of the perfectly developed organism. The demonstration of the encapsulated form on culture media has received but little attention. With the exception of the work of Hiss, the literature offers very little which is satisfactory in this regard. Guarnieri[3] found traces of capsules on his semi-solid medium, and very good ones in blood or hydrocele serum. A similar observation was made by Ortmann[4] in regard to the development of capsules in rabbit's blood serum. Later Schmidt[5] cultivated forms, similar to those regularly found in the blood of infected animals, on sterilized pneumonic sputum as well as on sterilized tracheal mucus. The presence of capsules in milk media was noted by Welch.[6]

A study of many stains under various cultural conditions seems to show that there are considerable variations in the size and configuration of the capsule of the pneumococcus, corresponding often to the macroscopic appearance of the growth and determined by a number of factors.

The Pneumococcus on Culture Media.—The type of capsule found on the most favorable *culture media* and under the best conditions will be found illustrated by Fig. 1. Here it is seen that the diplococcus is surrounded by a deeply staining, sharply defined elliptical band, situated at some distance from the body of the bacterium and separated from it by a clear area. The intensity with which the outer rim, or, as it were, capsular membrane takes on the color varies considerably. However, it is always well defined and prominent. The clear interspace is sometimes stained, but generally less deeply than the limiting membrane. The usual types of capsule have either

a regular elliptical outline, or present a constriction between the enclosed elements. Both forms are to be seen in the accompanying illustration. The narrowing above referred to is particularly often met with in luxuriantly growing, recently isolated cultures on favorable media, and may be assumed to indicate an early stage in the process of division. Cultures which show the perfectly developed forms will often contain many encapsulated single cocci and chains. and also empty capsules. The single forms are variable in size, as a rule small, varying from the coccus to the short bacillary type. The empty capsules are either circular, oval or slightly dumb-bell-shaped, with well defined and stained outlines, which surround a poorly staining or clear interior. The typical pneumococcus chains vary greatly in length. A short form, fused at one end, with the ordinary type is to be seen in the figure. Such chains are surrounded by a single elongated capsule which, as a rule, presents lateral constrictions between the diplococci. Well developed chains are separated from the outer membrane by a considerable band of either clear or poorly stained material, just as in the diplococcus forms.

Although the above description holds good with a certain number of the cultures regularly met with, one is apt to find a great many variations both in size, shape and staining ability, if a large number of stains be studied. Such differences depend upon some peculiarity of the bacterium itself, upon the medium and upon the number of transplantations made before examination.

Pneumococci, which have been recently isolated, and are grown on media which are most favorable for the development and preservation of encapsulated forms, may be grouped under the following heads: (1) Typical, normal sized (single or chains). (2) Small forms. (3) Large forms. (4) Bacillary forms. There are certain atypical forms whose morphology can easily be made to assume the ordinary type, by improvement in the nature of the culture medium. Such forms are not included in the above list. The first group has already been described. The second differs from the first only in size. Their capsules are smaller, and their outer limits approach the body of the coccus very closely. The large forms possess surprisingly wide capsules. The latter measure often many times the diameter of the coccus, have a tendency to break down, are less

sharply outlined, are of apparently more mucoid nature, and stain diffusely. Colonies of such forms when grown on two per cent. glucose serum agar* (as recommended by Libman),[7] may attain considerable dimensions. Some of the largest measure three mm. in diameter. Such diplococci may easily be mistaken for the *streptococcus mucosus capsulatus,* but are, as a rule, very definitely lancet-shaped, whereas the latter are possessed of a more rounded or biscuit-shaped form. The elongated, bacillary forms are now and then seen. I have frequently met with them on early transportations made from the mouths of normal individuals. They seem to occur principally on rather luxuriantly growing strains taken from serum agar. An example will be found in Fig. 6. At times the condition is much more marked than here depicted. Their capsules are narrow, and the limiting membrane is apt to be rather close to the body of the bacterium. It can often be seen that such pseudo-bacilli are made up of apparently confluent, coccoid elements.

Before entering upon the consideration of the morphology on the various culture media and in exudates, it may be well to take a brief critical survey of results obtained by the use of the technic described. The fact that the washing in water after the use of the fixing fluid does not destroy the capsules seems to bear out the theory that the Zenker solution fixes both the body and its envelope. However, the failure to stain the capsular substance (i.e., the material contained between the limiting membrane and body in some instances), and the marked definition of the outer membrane, lead to the supposition that perhaps a certain amount of condensation of the outer layers of the capsule takes place. Perhaps the bichloride of mercury contained in the fluid has this effect. The intensification of the outer membrane, when certain sera are employed as spreading fluids, could be regarded as supporting this view, viz., that the capsule substance imbibes sufficient serum to make it susceptible both to the action of the mercury and to the action of various stains. How much truth there may be in these theories we cannot say at present.

It is well known that the pneumococcus suffers considerable change in its morphology when grown in artificial media, especially after

*In this work, the serum media, unless otherwise stated, were made up with ascitic fluid. Hydrocele and pleural fluid also give similar results.

a number of generations. The media which I have found best for the development of the typical encapsulated forms are the following: Serum agar, glucose (0.5-2 per cent.) serum agar and Loeffler's medium. The serum agar media which have served me best were made by combining fluid agar with one-third its volume of sterile ascitic serum. The agar should be neutral to 0.5 per cent. acid (to phenolphthalein), and is to be made preferably with meat infusion. When 2.5 per cent. agar is used, this medium will have the requisite consistency. Its peptone content should be 1.5 to 2 per cent. Equally good, and at times even better capsules may be obtained from growths on serum agar to which dextrose has been added. For practical purposes the serum agar or glucose serum agar must be recommended. However, poorly developed capsules are often to be demonstrated on neutral or slightly acid agar without serum. This depends greatly upon the particular strain in hand. Very good specimens may often be made from growths in neutral bouillon. Better than this are serum-bouillon or glucose-serum-bouillon. These latter, however, are never to be relied upon after the organism has undergone a number of transplantations and must give way to the solid serum media for diagnostic purposes. Recently isolated cultures practically always show capsules in milk. This medium, however, does not lend itself to the development of clear and satisfactory specimens.

In making spreads from the various media, I have found certain little variations in technic of some value in obtaining successful results. In the case of the serum agar media the growth should be removed from the slant, care being taken not to immerse the culture into the condensation water below. However, when the latter contains a sufficient amount of serum, this precaution is unnecessary. When Loeffler tubes contain rather rich albuminous condensation water, growths taken from the latter are apt to show excellent capsules. The fluid media, as a rule, require rather thick, i.e., undiluted serum, for making the spreads. Fairly long encapsulated chains can often be demonstrated, especially in serum or glucose serum broth. Milk, as above mentioned, gives poor specimens. It is best to dilute a loopful of the culture with several drops of serum on a separate slide, before making the spread on the cover-slip. If I were to

summarize I should say that serum or glucose serum agar are the best media to employ for practical purposes.

When many strains of the pneumococcus are studied in successive generations upon the same medium, i.e., serum agar, interesting observations on changes in morphology can be made. Some retain the typical encapsulated form for months after isolation. Experiments with four such organisms carried on through a period of four months have shown very little alteration in morphology except for the smaller size of the bodies and capsules. Other strains again show evidences of involution in the very first generation. At times the second, third, or fourth generations present many of the following atypical forms—all, however, encapsulated. Of these I may mention the following: short chains, atypical diplococcus forms, poorly staining forms, those with degenerate capsules and coccoid instead of lanceolate elements. Of the anomalous capsule forms there are broken-down, degenerate capsules, and empty capsules. The short chains, when they enclose typical lanceolate elements, present the kind of capsule already described and illustrated. Their recognition and identification as pneumococci is not difficult. It is quite different when the capsule becomes narrower, even linear, approaching the body of the organism, and when the enclosed elements become coccoid. Such types are very common in old cultures. One often sees two terminal, almost coccus-like bodies at either end of a series of disk-like masses two, four, or even more in number. At times they are enveloped by a thin line separated by but a very narrow clear space, and at others, they are devoid of all vestige of a capsule. Their morphological differentiation from certain streptococci is impossible. There are many atypical diplococcus forms. I shall only mention a common variety, met with in old cultures as well as in first generations, and even in animal exudates. This is composed of a large globular element either separated from or fused with a very small coccus form. This may possess a well-developed capsule. The poorly staining chain forms, when stained with combined capsule and Gram procedures, often take on this appearance, viz.; some element of a chain are Gram positive, others negative, all surrounded by a Gram negative capsule. It is difficult to theorize on the occurrence of the empty capsules in recently iso-

lated strains. One meets with great variations as to frequency of the presence in different stocks. What is perhaps of most significance, from the practical diagnostic standpoint, in the morphology of the pneumococcus cultivated for a number of generations, is the assumption of the streptococcus form, at times with capsules (such as described), and at others devoid of them. There are great differences in the length of time which the typical encapsulated lanceolate form will persist. The change to the streptococcus type may take place at any time.

The Pneumococcus in the Body Fluids.—In the exudates and blood of animals which have died of pneumococcus infection, the encapsulated type is stained with little difficulty. Here we regularly see the perfectly developed form of the organism. I have usually been able to obtain very beautiful specimens by the use of the Welch method. In fact, with the latter procedure the capsules are somewhat larger, since they do not suffer the contracting influence of bichloride of mercury used in the method above described. Permanent mounts of the Welch stained specimens may be made, if desired, in the following manner: After the saline wash, the coverglass is flushed rapidly with a 5 to 10 per cent. potassium ferro-cyanide solution in water, dried with blotting paper, and mounted in balsam.

We also find the typical forms in the pus from empyema cases, in the exudate in peritonitis, and arthritis, and also in the sputum. The empyema exudates (pneumococcus) may be divided into three general types: (*a*) thin sero-purulent, (*b*) thick creamy purulent, and (*c*) thick, mucoid varieties. The first of these, when allowed to stand, will often separate into an upper layer of serum and a lower layer of pus. Such exudates, as a rule, show the typical encapsulated diplococci. Now and then chains of two diplococci (i.e., four members) are to be seen. The addition of serum is unnecessary for the staining of such fluids. The capsules, as a rule, have a sharply defined outline, and are diffusely stained. The thicker exudates (*b*) may need the addition of serum. It is often difficult to demonstrate the encapsulated forms in the last (*c*) of these fluids. Here it is always better to mix up the pus thoroughly with some serum on a slide, and then transfer a sufficient quantity on a cover.

The morphology of the pneumococcus in peritoneal exudates is

the same as in thin pleural fluids. However, one meets with instances where spreads will show short streptococcus-like chains with either a faint linear capsule or no envelope whatsoever. The morphological diagnosis between pneumo- and streptococcus is impossible from such specimens. Culture after 24 hours, however, will often present the typical pneumococcus forms.

It is of interest to note the persistence of the capsule in these exudates. Photograph No. 3 was made from a specimen of empyema pus which had been allowed to stand at room temperature for two weeks. During the first week, it contained practically nothing but typical diplococci. After this, a tendency to chain formation was observed, and involution forms and empty capsules made their appearance. Examinations of this specimen of pus were extended through a period of three months. An excerpt from my notes describes the following conditions, forty-five days after evacuation of the pus: "There are still many encapsulated pneumococci; many fail to hold the Gram stain, but possess capsules. Short chains with narrow envelopes are to be seen. Frequently one or two or four members of a chain fail to stain Gram positive. Empty capsules have increased in number. Sometimes a single coccus remains in a capsule which had evidently enclosed two members." Examinations made at the end of three months showed the disappearance of the greater number of the organisms. However, those which remained, although often atypical and degenerate, possessed poor, but distinctly staining capsules.

Similar observations were made in a number of other empyema exudates. Intracellular pneumococci were met with in a peritoneal exudate. It is difficult to avoid over-staining in such specimens; the leucocytes are apt to stain so deeply with gentian violet that enclosed pneumococci with their capsules may escape observation. In this pus, degenerate chains and bottle-shaped involution forms with distinct capsules were to be made out two and one-half months after evacuation of the exudate. In neither of the above-described fluids was it possible to cultivate the pneumococcus at the end of the stated periods. Perhaps the study of a larger amount of material will corroborate the conclusions which the above observations may warrant, viz.: that the capsules of pneumococci, in the fluids taken

out of the animal body are no more susceptible to autolytic changes than is the body of the bacterium itself.

Finally, I may call attention to a number of points in regard to the character of the pneumococcus in sputum. The preparation of good specimens from sputa is often somewhat difficult. Successful results depend to a certain extent upon their chemical and physical properties. It is always best both for mechanical and chemical reasons to mix up some of the sputum with dilute serum. Often the fuchsin stain, or the capsule combined with the Gram method, gives the most satisfactory results. It is the rule to find the typical diplococcoid forms. The size of the capsule varies considerably, and now and then one may meet with envelopes of very large dimensions. For practical purposes of diagnosis, when no pneumococci are found in the spreads or when the equipment for animal inoculation is not at hand, or when the demonstration of the organism on plates is difficult, successful recognition of the pneumococcus may be made in the following way: Several tubes of serum agar or Loeffler's blood serum medium are inoculated in series.* Capsule stains made on these tubes after 16 to 24 hours often show the typical encapsulated forms, mixed with many other organisms.

The Streptococci.—I wish to include a short consideration of the morphology of streptococci in my paper, not because they belong as a class to the encapsulated bacteria, but rather because some of them show those stages in development of a true capsule which may be said to be intermediary. The many recently reported instances of the occurrence of encapsulated streptococci has added to the confusion which already existed in our views of the relationship of the pneumococcus and streptococcus. To my knowledge, no systematic study of the finer structure of streptococci with reference to the presence of capsules in exudates and on various culture media, has been made.† All of the recorded cases seem to fall under what I shall designate later as the group possessing "mucoid cap-

*Inoculation is made as follows: A loopful is streaked on the first tube; what remains on the loop is smeared on the second, and so on, until four or five tubes have been used.

†Since the writing of this paper, March, 1905, a few observations on the capsules of streptococci have been made by other authors.

sules." Whether or not streptococci with capsules comparable to those of a typical pneumococcus have been met with, it is difficult to say from what one can read in the literature. The observations on exact configuration of capsules in general lack a definite character, because of the employment of the older methods of staining. With the latter, the structure of the organisms on culture media, were often imperfectly represented.

In my own work I did not intend to go extensively into this phase of the subject. My object was rather to record the observations on the morphology of streptococci to which the capsule method had been applied in a routine fashion. Some 150 strains were stained. Many of these were observed in the original exudates, in various media, and in test animals. Others were only studied in serum, or serum-glucose-agar media. These two groups (about 50 in all) comprised only pyogenic streptococci. They had been isolated from such cases as the following: phlegmon, phlebitis, osteomyelitis, empyema, abscesses, infection of the uterus, streptococcemia, etc. A larger number, about 100, were isolated from the mouths of normal or diseased individuals. The pathogenicity of the strains was only determined in a few instances, and most attention was paid to their structure on the Loeffler or serum agar medium.

For my purposes, I shall consider the streptococci under the following heads, subdivided with reference to the possession of a capsule or envelope. A.—(1) Streptococci without capsules. (2) S. with capsules. B.—S. with mucoid capsules, described separately as "S. mucosus capsulatus."

(A) Like the pneumococcus, the streptococcus presents an extremely varied morphology depending on many factors. In purulent exudates it more often shows evidences of degeneration than the lanceolate organism. When stained with the capsule method, certain details in its finer structure, which escape observation with the Gram or single stains, become very apparent. Of these I may mention, first, the presence of a capsule, and, secondly, the differentiation of normal from poorly staining and degenerate elements.

We find streptococci, both in exudates and on favorable culture media, which are wholly devoid of a capsule. Many strains, from widely different sources are alike in this regard. Some of those

examined were isolated from septic cases, others (probably saprophytic) came from the mouths of normal individuals, others were obtained from the feces, and still another series from cow's milk.

There is, however, another large class of these organisms, which has this in common: i.e., a characteristic envelope, distinctly different from a typical pneumococcus capsule, but indistinguishable from that belonging to the degenerate chain type of the pneumococcus. It is represented by a deeply stained line which surrounds the chain at close range, and having fairly deep indentations between each coccus element. When examined with a high power (1000 diameters), it is seen to enclose the two hemispherical elements of a single coccus. It thus differs from a well-developed capsule of the pneumococcus in the following points: It is more membrane-like; its limiting line is situated much closer to the body of the bacterium, and it envelops the single cocci rather than the pairs. It resembles to a certain extent the shrunken capsule about degenerate pneumococcus chains (see Figure 3). These capsules may be regarded rather as outer envelopes, or membranes, than as true capsules. They seem to lack the mucoid substance which is characteristic of the pneumococcus and streptococcus mucosus capsulatus.

Forms, such as just described, are rather frequently found in the mouths of normal individuals. In purulent exudates, the occurrence of degeneration forms is the rule. Membranous envelopes may enclose several members of a chain, and be absent on the rest of the elements. The membrane may even persist where its enclosed elements show marked evidences of degeneration, and take on very little stain. More rarely a diplococcus form, with a capsule such as described may be found free or contained in a leucocyte.

The importance of the recognition of these encapsulated streptococci and their differentiation from pneumococci shall again be dwelt upon later in the paper. It may suffice for the present to call attention to the following: That there is little difficulty in distinguishing between the encapsulated typical lanceolate chains of a pneumococcus and the streptococci described; that, however, the pneumococcus may resemble the streptococcus, especially when grown in culture for a number of generations, and very rarely in exudates.

The demonstration of capsules of this type is somewhat more dif-

ficult than in the cases of other organisms. Apparently, such envelopes are very susceptible to external influences. It is best to use rich glucose serum agar and examine before 24 hours have elapsed. Loeffler's solid medium answers admirably. I have obtained most uniform results by using undiluted beef serum, for the purpose of spreading.

(B) *The Streptococcus Mucosus Capsulatus.**—Under this name I wish to group a series of organisms which in their morphology, cultural characteristics and virulence for the ordinary susceptible animals, have something in common, both with the streptococci and the pneumococci. Lest I digress too far from the subject matter under consideration, I shall content myself with a brief reference to a few of those organisms described in the literature, some of which may perhaps be included under this name. They all seem to agree in the possession of marked mucoid envelopes.

Hlava[8] describes streptococci with homogeneous mucoid envelopes, and thinks that they belong to the class "Leuconostoc hominis." His organisms were isolated from the mouths of cases of scarlet fever, measles, normal cases, follicular tonsillitis, diphtheria and other throat infections. Characteristic for his cultures was the absence of capsules on media, to which no sugar had been added.

In 1897 Binaghi[9] isolated an encapsulated streptococcus from a guinea-pig suffering from multiple pulmonary abscesses. This organism grew with transparent watery colonies on agar and produced a gelatinous hemorrhagic exudate at the site of inoculation in guinea-pigs. Its virulence rapidly diminished in successive generations.

The name "streptococcus mucosus" was applied by Howard and Perkins[10] to a species which they obtained from the heart's blood, spleen, peritoneum, tubo-ovarian abscess, and right kidney of a case of peritonitis, following a chronic tubo-ovarian abscess. Although capsules were especially prominent in animal exudates, they were not able to stain them in cultures on artificial media.

A number of other instances are the organisms of Bonome,[11] isolated from the meningeal exudates of cases of cerebro-spinal men-

*Since writing this paper I have described in detail the characteristics of this organism in the Centralbl. f. Bakt. Orig. 41, p. 314.

ingitis, the mouth "streptococcus aggregatus" of Seitz,[12] and those of Kurth[13] and Besser[14].

Not having had the opportunity of studying the organisms of others, I will describe only the morphology of my own strains. The remarks which I shall make apply with little variation to the eight streptococci studied. The following list will show the source of these bacteria:

S. mucosus capsulatus No. I.—from the cerebro-spinal fluid of a case of acute meningitis. Lumbar puncture was done immediately after death.

S. m. c. No. II.—From the blood of a mouse which apparently spontaneously acquired infection with this organism.

S. m. c. III to VIII inclusive.—From the mouths of normal individuals, not afflicted with any local disease.

These streptococci resemble each other closely in their morphological and biological characteristics. When cultivated on the most favorable media (serum agar and glucose serum agar), they possess a luxuriance of growth which surpasses that of the most rapidly growing pneumococcus. Macroscopically, however, their colonies have the same watery appearance. When viewed by reflected light, surface growths are apparently transparent. They do not transmit all the light, however, and a slanted agar tube held up to the light is seen to be covered by a somewhat opaque, milky layer. There is decided tendency for colonies to coalesce, forming a mucoid, uneven covering on the surface of the tube.

In the exudate and blood of infected mice, these organisms are most apt to appear in the form of round, biscuit, or rarely almost lancet-shaped diplococci, surrounded by a wide, mucoid, diffusely staining and definitely limited capsule. Now and then there are chains of four elements and even six, surrounded by a similar envelope. The diplococcus forms, may at first sight, be mistaken for pneumococci. The latter, however, when they occur in infected animals, as a rule, take on the typical lanceolate form. The mucoid streptococcus is not lanceolate, its capsule elements are larger, and short chains are generally to be found. Pneumococcus chains, when they occur, present quite a different picture. Evidences of constriction between the diplococci are generally to be discerned. With

the streptococcus mucosus the capsule of the chain is one elongated mass of mucoid substance, containing within it round or biscuit-shaped bodies, very often atypical in their arrangement, with no corresponding indentations on the outer surface of their envelope.

On culture media I have regularly been able to demonstrate capsules, although streptococcus mucosus No. I has been kept alive on artificial media for almost six months. Growths on serum media, milk, Loeffler's coagulated beef serum, bouillon and neutral agar show marked variations in the morphology of the organism. Capsules have been found present in all of these media. Their size and development appear to go hand in hand with the luxuriance of growth that is obtained. Thus the typical mucoid form must be sought on the most favorable media, which are those containing serum. When studied on serum agar, its character from generation to generation may undergo the changes which I am about to describe. The very first sub-cultures made from the blood or the exudate of an infected mouse will often show a predominance of the diplococcus forms. This, however, is variable, some strains presenting quite as many short chains as diplococci. It very often has appeared to me that there is a certain relation between the occurrence of the diplo-forms and those factors which are favorable for the most abundant growths. Thus with the richest serum and the best agar some of the strains have shown this tendency to double cocci rather than chains for quite a number of generations after isolation. The same seems to hold good to a certain extent for the pneumococcus. In these early sub-cultures the capsule of the streptococcus mucosus, as a rule, resemble more or less closely those described as occurring in animal exudates. After many generations there may or may not be evidences of involution changes, and changes in the structure of the capsules. What we regularly find is the following: The mucoid envelopes lose their breadth and are replaced by narrower envelopes, which gradually approach the type described for certain streptococci. Thus the streptococcus mucosus may present the following picture: Short chains of four to six elements (sometimes even eight or ten), generally composed of either round or biscuit-shaped elements, with or without evidences

of degeneration, are surrounded by a distinct membrane-like envelope at a short distance from the cocci themselves. Appearances like this may be produced at any time by growing the organism on dry or otherwise unfavorable media. With sufficient care in the technic, one rarely fails to demonstrate either the mucoid or shrunken type of capsule on this group of streptococci. Figure 4 shows the type of capsules surrounding chains. Figure 5 illustrates, even better, the mucoid nature of the envelopes.

In dealing with these forms, one must keep in mind the characteristic viscosity and mucoid nature of the capsules. These qualities lend the peculiar watery appearance to the surface growths. In the blood and exudate of animals little difficulty is experienced in obtaining excellent results. On the culture media, however, conditions are somewhat different. Some sera used for dilution and spreading seem to possess physical and chemical properties which are destructive to the capsules. Again, the stringy nature of the material does not lend itself easily to the preparation of evenly distributed, clean fields. Over-manipulation may destroy the contour of the envelopes. Figure 5 shows this characteristic. The capsules are in great part broken up. Some are empty and the field presents evidences of the presence of the stringy mucoid substances left by the spreading of these streptococci. On the other hand, one repeatedly meets with very perfect forms on the Loeffler medium, when the culture has been taken directly from the mouth and is about 24 hours old. In such mixed cultures I have seen the best preserved capsules, often with as definite a limiting membrane as one finds in the case of the pneumococcus. There is always, however, the tendency to deeper and more diffuse staining in such instances.

Whether or not the contracted, more membrane-like capsule seen in old cultures and on poor media is exaggerated by the employment of the fixative, I am unable to say. Perhaps a certain amount of shrinkage can be accounted for in this way, but certainly not all.

The differentiation of this organism from the other types of streptococci and from pneumococci shall receive further attention later in my paper.

The Group Bacillus Mucosus Capsulatus.—This general name was

proposed by Fricke for the organisms resembling the Friedlaender bacillus, and shall be employed here, irrespective of the origin of the bacilli, be it the lungs, nose, mouth or alimentary canal. In the article on this group of organisms, in the *Handbuch der Pathogenen Mikro-organism* (Kolle and Wasserman),[15] R. Abel makes the following statement: "Die im Körper gekapselten Bazillen zeigen auf den üblichen künstlichen Substraten gezüchtet nur in den ersten Generationen noch hier und da deutlich abgegrenzte Kapseln. Meist fehlen sie und sind ersetzt durch eine dichte Schleimmasse, in die Bazillen eingebettet sind."

Although my studies on the capsules of these bacilli were not carried on as systematically, on as many strains, and under such varied conditions as in the case of the pneumococcus, the presence of capsules on culture media was conclusively demonstrated in about twenty different strains. The factors upon which the development and staining of a distinct capsule depend, are somewhat different here than in the case of the organisms previously described. We have to deal with growths which are even more mucoid than those of the streptococcus mucosus. These technical difficulties are, therefore, somewhat greater.

Just as with the pneumococcus, it is the rule to get very satisfactory capsules on organisms recently isolated. Here, however, the serum media are not essential. I have been able to demonstrate the largest and best defined envelopes on ordinary agar growths. Manifold variations in configuration, size, and viscosity of the capsules of this group of bacteria are found. The differences depend not only upon the strain, but also upon the cultural conditions.

Three organisms of my series, when cultivated upon agar, were unique in the luxuriance of the surface growth, and in the large size and definition of the envelopes. One of these bacilli was isolated from the feces of a suspected typhoid fever patient, and the other two from the mouths of normal individuals. A reference to Figure 7 will give an idea of the nature of the capsules obtained. The bacilli are surrounded by very broad, deeply staining mucoid envelopes, which measure many times the diameter of the body of the bacilli. In the specimen from which the photomicrograph was taken, the outer layers of the capsules took on considerable stain, leaving a clear area about the bacilli. Such pictures are not always

obtained. At times, even the clear area is stained, although, as a rule, not as deeply as the exterior. Finer details in the morphology are also to be seen, viz.: the poorly staining ends of the rods, a characteristic very often found in bacilli of this group. In photograph No. 8, a mixed culture of the *b. mucosus capsulatus*, with a large unidentified contaminating organism, was stained in order to demonstrate the absence of any visible capsule on the latter. The mucoid nature of the envelopes and their tendency to diffuse are illustrated.

That the large size of the bacillus and its capsule was not an essential feature of these three organisms, was shown by the manifest differences in morphology under other cultural conditions. Thus, manifold variations in size were observed on the various media. In bouillon and glucose bouillon, the surface scum formed after three days, often showed somewhat smaller bacilli with diffusely staining, poorly outlined capsules. Dry, unfavorable media presented smaller forms similar to those pictured in another photograph (Fig. 9).

Although it was the rule to find capsules on the strains studied, at times results were unsuccessful. I will refer to these instances later on. The more usual types met with are smaller than those above described, the outer limiting line of the capsules is narrow and well defined, and is best developed in the ordinary solid media. Very small types are often seen on Loeffler cultures taken directly from the human mouth. Such a specimen is reproduced in photograph No. 9.

A small number of bacilli, which from the cultural standpoint would be classified with the mucoid encapsulated bacilli, showed no evidences of capsule. Whether this could be ascribed to some autolytic process, whether the bacilli produced only a mucoid, slimy amorphous substance, or whether their chemical and physical properties were not compatible with spreading in serum, I would not venture to say. Such instances, however, were rare.

It seems that all the ordinary media, upon which a good growth can be obtained, are favorable for the development of well limited capsules. Cultures on the solid media are best examined after 24 hours. In bouillon, however, it is often advantageous to take a

portion of the surface scum for this purpose. This does not develop in all strains, and when present takes a few days to form.

I have at times observed that the single colonies on plate isolations are better suited for the purposes of staining than the confluent growths on the surface of agar. There, also, we now and then meet with exceptions. A bacillus of the Friedlaender group, isolated from an appendix and plated out on glucose agar, was studied for the presence of capsules. It was regularly found that the bacilli of the surface colonies were either devoid of them or showed the presence of but a very few, whereas the deep ones, were composed wholly of small single or diplococcoid encapsulated forms.

As the cultures on agar slants become old, changes take place which are destructive to the capsules. It would appear that the failure to demonstrate well-defined envelopes in growths whose macroscopic, mucoid appearance would seem to warrant their presence, is due either to a fusion of the mucoid envelopes into one slimy mass, or to the overproduction of this substance with failure to develop distinct capsular membranes.

Cultures kept alive on artificial media for months, and even longer than a year, regularly showed the presence of capsules. Seven such strains were obtained through the courtesy of Dr. Bernstein of this laboratory. Most of the bacilli were possessed of the small membranous type of capsule, but even some of these developed into larger forms under favorable conditions.

In regard to the technic, it may be said that sometimes considerable manipulation will not destroy the limits of the envelopes. This was found especially true for the Friedlaender bacilli, isolated from the throat on Loeffler's blood serum. At times, however, the bacilli must be carefully spread with a view rather to the preservation of the capsules than to the preparation of evenly distibuted fields.

The application of the Gram method combined with the capsule stain is of importance in differentiating the small diplococcoid forms of the bacillus with membranous envelopes from pneumococci in mixed cultures. I have often been able to diagnose the presence of both of these organisms in a single spread taken from throat cultures. To insure satisfactory staining of the capsules, the strong fuchsin counter-stain should be applied for a minute or longer, the

specimen washed with water and examined in this fluid. The clear area between the body of the red Friedlaender bacillus and its envelope makes the recognition of the capsule easy. The body of the pneumococcus is Gram positive and its capsule takes the counterstain.

Time did not permit me to investigate the question of the presence of capsules on the bacterium lactis aërogenes (Escherich). Whether morphological differences between this and the above group exist, deserves special study.

Miscellaneous Bacteria.—I wish to make some mention of the morphology of the following organisms when they are examined by the capsule method, viz.: b. aërogenes capsulatus (Welch, E. Fraenkel), b. anthracis, diphtheriæ, typhi, coli communis, staphylococcus albus, aureus; micrococcus tetragenus, gonococcus, catarrhalis, sarcina, and a number of unidentified bacteria.

The *bacillus aërogenes capsulatus* was isolated by Welch[16] in 1891. The organism is probably the same as that described by E. Fraenkel in 1893[17] and called by him "bacillus phlegmones emphysematosæ." The demonstration of a capsule on this bacillus has been a matter of some difficulty. I have obtained such organisms from post-mortem cases for the study of their capsules. If some of the emphysematous tissue be mixed with serum and spread upon a cover slip, the capsules of this organism can regularly be stained by the method described. It is best, however, to employ an anilin water gentian violet of double the strength (ca. 10 per cent.) in order to insure sufficiently deep staining. When prominent, the capsule appears as a sharply defined band, surrounding the bacillus and separated from it by an almost clear narrow space. One should not attempt to obtain a perfectly clear field, for the presence of a considerable amount of serum often prevents dissolution of the capsule. A thorough study of the morphology on various media was not made. In milk tubes, cultivated anaërobically for 24 to 48 hours, the presence of the coagulum and thin watery fluid make the preparation of specimens easier than with pneumo- and streptococci. Luxuriant growths may be treated in the following way. A mixture of a few loops of the watery fluid and a couple of drops of undiluted, or rather thick serum is made on a slide from which a

sufficient quantity is transferred to, and spread upon a cover-slip, allowed to dry, and then stained in the usual way (fixation, etc.). Fine linear capsules have also been observed on serum glucose agar and glucose agar.

*The Bacillus Anthracis.**—Serafini[18] first called attention to the presence of capsules on this bacillus. He found them only in the body fluids of infected animals. The question as to whether the capsule is an integral part of the bacillus under all conditions, or as to whether it is produced only under the influence of the serous fluid of the body, is still a matter of controversy. They have been demonstrated in culture, by Johne, Haase, and others in a few instances.

When cultivated on agar, the bacilli can often be shown to possess distinct envelopes. The latter take the form or sharp, straight lines, separated from the rods by a clear space, so that it appears as if the segments were contained in a membranous capsule. Here, again, undiluted serum is preferable, and too much manipulation spoils the picture. In serum agar media containing dextrose, spore formation is more rapid, and the demonstration of capsules is not usually successful. However, the agar specimens seem to leave little doubt as to the genuineness of these outer envelopes. Linear capsules were also observed in a number of other organisms. A *sarcina lutea* grown on serum media frequently showed distinct envelopes. The *micrococcus tetragenus* often possesses a capsule on Loeffler's medium, and, as a rule, in sputum and animal exudates. Most of the strains which were examined, possessed well-defined but rather narrow capsules on the Loeffler medium.† A number of unidentified bacilli were encountered, whose envelopes resemble those of the b. anthracis. In beef serum obtained from the slaughter-house, an encapsulated diplococco-bacillus is often seen. Its elements are characteristically quadrate with an enveloping membrane, which is very closely applied to the body. It must not be mistaken (when using such contaminated serum) for a pneumococcus or Friedlaender bacillus. When once

*Obtained through the courtesy of Dr. Elser, New York.

†At the time of writing (1905), I isolated an unusual form of the micrococcus tetragenus. Its capsule was very wide and of a mucoid nature. Often the capsules of several groups fused together into a large mass of mucigenous substance enclosing three, four, or more tetrads.

seen its recognition is easy. Nothing in the nature of a capsule could be demonstrated on the following organisms: micrococcus catarrhalis, gonococcus, staphylococcus, meningococcus, bacillus diphtheriæ, tetani, and bacterium coli commune.

The morphological differentiation of the pneumococci and streptococci; the comparative value of some of the various methods, physiological, biological, etc.—In spite of the employment of the newer bacteriological methods, of new media, of fermentative agglutination and other differential tests, the problem of the separation of the streptococci and pneumococci into distinct, well-demarcated classes often affords great difficulty.

Let us review some of the distinguishing cultural characteristics that have often been pointed out. The appearance of the surface growth of these organisms on the various culture media is subject to such wide variations that they can at best be but aids in differentiation. We know that in general the pneumococcus colonies are more watery than those of the streptococci. Though this may hold good in the case of some media, on the more favorable, such as serum agar, the surface appearances are often identical. The failure of the pneumococcus to grow on gelatin at low temperature (22° C.) is also of little use.

Differential properties in metabolic activity have, of late years, been sought for in the hope of finding a solution to the problem. The methods I wish especially to discuss are two. The first of these, although never promulgated as a method, is based upon an observation made by Libman in his work on precipitation in serum media. The second was suggested by Hiss at the third meeting of the Society of American Bacteriologists.

(1) *The precipitation in serum media.*—An evidence of differences in metabolic activity of different bacteria becomes manifest when cultures are grown upon serum glucose media. In 1901, Libman described the characteristic "whitening" or "precipitation" produced by certain bacteria when cultivated in solid media containing certain sugars. He observed that streptococci regularly, pneumococci only exceptionally, cause this change in the media.

Although no systematic study of the growth of large numbers of streptococci and pneumococci on these media has been made by

me, a great many observations recorded from time to time on 75 different strains of the former, and 60 of the latter, have enabled me to make certain deductions.

The medium already referred to is a two per cent. glucose agar to which about one-third its volume of sufficiently rich sterile ascitic serum has been added. Practically all of my streptococci caused precipitation in 24 to 48 hours. Only a very few poorly growing strains failed to produce any marked change in the medium. With the pneumococci exactly the reverse condition obtains. But three out of the 60 precipitated, and two of these only after 48 hours.*

At that time Libman ascribed this change in main to the production of acids from the fermentable carbo-hydrates. Of late, both he and myself, from independent observations, have come to believe that perhaps the formation of certain ferments plays a role in addition to the acid production. Thus I have found that not only the pneumococcus, but also the streptococcus mucosus does not cause whitening† of the medium, although in many tests evidences of the abundant production of acid from glucose were obtained. In favorable media containing glucose, all three organisms, pneumococci, streptococci and streptococcus mucosus capsulatus, produce considerable acid.

(2) *The inulin medium in the differentiation of the pneumococcus and streptococcus.*—Hiss found that in a fluid medium made up of beef serum one part, water two parts, litmus, and one per cent. inulin, the formation of a coagulum and acid production are characteristic for the pneumococcus. That is to say, all pneumococci were found capable of splitting up inulin with the production of acid. Streptococci, however, failed to show this property. Such a medium was therefore to be regarded as affording a reliable method of differentiation between the two organisms.

During the summer months of 1904, I was engaged in the study of the fermentative properties of certain pathogenic and saprophytic streptococci, with a view, perhaps, to grouping the strains of these organisms according to similarity and differences in their action

*In more recent work (1907) we have found that pneumococci may acquire this property of precipitating glucose serum agar in the human blood.

†The words "precipitation" and "whitening" are used interchangeably.

upon carbo-hydrates.* Owing to the intervention of other themes, sufficient time was not at my disposal for the completion of the work. However, marked differences were observed. At that time a streptococcus isolated from the blood of a patient suffering from streptococcemia with "malignant endocarditis," presented the ability to ferment inulin in a medium made up of this carbo-hydrate and sugar-free bouillon. Later, when tested on the inulin serum water medium, a like result was obtained. Since that time, another streptococcus, also from the blood of a case of streptococcemia secondary to phlebitis, and periphlebitis of the leg, showed the same property. Thirty other strains from many different sources were tested, but none was found able to split up inulin.

On the other hand, most pneumococci, as well as the group described under the name "streptococcus mucosus capsulatus" were found to produce acid in this medium. In a study of pneumococci for the "Pneumonia Commission"† I noted that some strains of this organism failed to ferment inulin in certain generations. Recently (1907), we have encountered pneumococci, which have lost this property in the blood of cases of bacteriemia.‡ We can, therefore, at this juncture, only say that while it is probable that most pneumococci can split up inulin, some of the ordinary pyogenic streptococci as well as the group "streptococcus mucosus" also possess this power.

Finally, we may consider the inoculation of susceptible animals for purposes of diagnosis. The virulent strains of pneumococcus, when injected into white mice, cause rapid death with invasion of the blood with the typical lanceolate encapsulated forms. Such organisms are, however, not those which give us any difficulty. The recognition of the streptococcic and degenerate forms of pneumococcus (which, owing to the loss of virulence, produce no sepsis) is only possible by tedious and repeated inoculations from animal to animal; and even this method may fail us, as I have frequently observed, in that type of pneumococcus which soon loses its typical morphological and cultural properties, as well as its virulence.

*The observations made at that time have since been published. Journ. Exper. Med., 1907, 9, p. 428.

†Journal of Exper. Med., Vol. VII, No. 5.

‡These studies will be reported by Dr. C. Ryttenberg and myself.

What with the variations in the characters of the different strains of the pneumococci and streptococci already described, and what with their points of similarity in morphology, cultural properties, metabolic activity and virulence for animals, the problem of the separation into two distinct classes becomes a difficult one. The questions as to the common origin of these organisms and as to the propriety of dividing them into two hard and fast classes, I shall not attempt to answer. For practical purposes, however, it still remains convenient to group these organisms separately. The difficulty seems to rest in the decision as to what differences in cultural and chemico-physiological properties, or morphology, are within the limits of variation of one species. Thus Kruse[19] would establish close relationships between the lactic acid streptococci and pneumococci, because of the similarities made mention of in the following statement: "Seine Gestalt, seine Neigung zur Kettenbildung, seine färberischen Eigenschaften (Gram), sein Verhalten zu den Nährboden, auch zur Milch, sind im wesentlichen die gleichen." From a study of a number of strains of the "streptococcus lacticus" it appeared to me that in spite of their frequent lanceolate diplococcus-form, they should be classed rather with streptococci. The absence of capsules under the most favorable conditions, and in all the strains, the precipitation of the serum media and their failure to produce acid in inulin, would warrant this view.

Which of the various characteristics, morphological, cultural or otherwise should decide us in our grouping of these organisms? When the pneumococcus takes on the typical encapsulated form, its recognition is easy from its morphology alone. It is then to those strains, which, either in the exudates of the body or in culture media, lose their capsules or assume the streptococcic type, that we must direct our attention.

The encapsulated diplococcus form of the pneumococcus may be regarded as present under conditions most favorable to its growth. These are to be found in the exudate and blood of infected animals and to a certain extent upon certain culture media. The same may be said of the streptococcus mucosus capsulatus, its morphology being somewhat different, especially in the tendency to chain formation. Both these organisms agree to a certain extent in the morphological changes which

they undergo in transplantations on the media. The disappearance of the capsule and the assumption of the chain type are features of the pneumococcus. The tendency to form chains with the degeneration of the capsule are characteristic of the streptococcus mucosus. We should, therefore, regard these atypical forms as evidences of degeneration, as labile characteristics, subject very often to reversion back to the original type when suitable conditions obtain, either in the body of an animal or on favorable culture media.*

In practice and routine examinations, when exudates (generally human) do not allow of the demonstration of the encapsulated organism by reason of their peculiar chemical and physical properties, the diagnosis may be made, as a rule, within 20 hours by the identification of the capsular forms in the culture media already mentioned. I have repeatedly noted this in the case of very mucoid sputa and pus. Those rare instances where, as in the case of peritonitis already cited, the pneumococcus appears as non-encapsulated short chains, may have to be dealt with differently. In one case, the pneumococcus was seen to assume its encapsulated form in the very first transplantations on the solid serum media. When this does not occur, we are evidently dealing with a degenerate pneumococcus, which will not revert to its type in the media employed, or with a streptococcus. It is then that the other fermentative and cultural tests must decide us. In view of the fact that most pneumococci (as far as we know) produce acid in the inulin media, the latter, although not specific, are of value in the diagnosis. If no acid be produced, we are in all probability dealing with a streptococcus. On the other hand, an organism which does cause fermentation may be either one of the two. For such, the employment of glucose serum agar is to be recommended. The absence of all signs of precipitation will speak for pneumococcus.

I do not intend to dwell further upon the use of animal inoculations, nor to discuss at length the differential points between the pneumonococci and streptococcus mucosus. That the latter represents

*Recently (1907), two years after writing above, we have found further evidence in support of this statement. We have been able to produce complete changes in the fermentative powers of pneumococci by passage through animals. These experiments will be reported in the near future.

a different species from the former, seems to be supported by many points in their morphology and mode of growth. What is, perhaps most characteristic for the streptococcus mucosus capsulatus, is its peculiar morphology in animal exudates and on culture media, the persistence of its capsules, the profuse characteristic growth on the solid serum media,* its virulence for certain animals, its failure to precipitate serum agar in the presence of glucose and its ability to ferment inulin. I shall reserve further consideration of this rather interesting organism for a later paper.†

In conclusion I wish to emphasize the importance of the nature of the medium employed in making cultures of the strepto- and pneumococci. It is evident from the foregoing that the demonstration of the typical pneumococcus forms in culture is one of the most reliable modes of identification. Although the streptococci may possess capsules which resemble the degenerate encapsulated pneumococcus forms, we have not met with any in this study whose capsules present the picture peculiar to the pneumococcus. Media, such as Loeffler's and particularly serum (ascitic or hydrocele), and glucose serum agar afford a pabulum conducive to the production of this typical form, and also allow of changes (precipitation in the latter) which are at times significant. It seems that much may be expected from improved media in which it may perhaps be possible to convert even the most refractory streptococcic forms of the pneumococcus back to their typical shape. A review of what has been said in regard to the cultural characteristics of these organisms makes it evident that even the newest methods are at best but aids in a diagnosis, and that we must for the present be content with what can be learned from a proper consideration of the morphological, cultural, and other characteristics of these organisms.

I wish to thank the members of the Attending Staff of Mt. Sinai Hospital for their kindness in putting much of the material at my disposal; also the members of the House Staff and especially Drs. A. E. Cohn and J. J. Hertz.

*During the past few months (1905), I have isolated several strains of pneumococci whose luxuriance of growth equals that of the streptococcus mucosus. The identification of such forms will be discussed in a future publication.

†Centralbl. f. Bakt. XLI., Orig. pp. 314, 414, 511.

I am greatly indebted to Dr. F. S. Mandlebaum, pathologist of the hospital for the photomicrographs reproduced in this paper.

NOTE.—The work upon which this paper is based was carried on in 1904 and 1905 at the Mt. Sinai pathological laboratory, and published in the Centralblatt für Bakteriologie, Orig. XXXIX, p. 216. Additional studies along these lines have been since made, some of which have already been published. Recently, the question of the differential diagnosis of pneumococci and streptococci has been the subject of further work by Dr. Ryttenberg and myself. Very interesting changes in cultural properties were found to take place in pneumococci that have been circulating in the human blood. These points shall be recorded in a future publication.

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EXPLANATION OF PHOTOMICROGRAPHS.

Fig. 1.—Pneumoccoccus; culture on serum agar; X 1500 Typical capsules, singe cocci, diplococcus forms, and a short chain, are shown; a few empty and degenerate capsules are to be seen.

Fig. 2.—Mixed culture from the throat. Loeffler's medium; X 1500.

A short streptococcus and pneumococci. Two short chains, two lanceolate diplococci and two biscuit-shaped diplococcus forms. The upper chain in the photograph is typical; the lower chain is surrounded by a capsule whose ends are empty, and on its right a small form fuses with the side of the chain.

Fig. 3.—Old (14 days) empyema pus; X 1500. Below are two pus cells; the left contains a degenerate pneumococcus. Four atypical encapsulated pneumococci occupy about the central portion of the field. Far on the left is an empty capsule. Above is a degenerate pneumococcus chain with a capsule resembling that more commonly found on streptococci.

Fig. 4.—Streptococcus mucosus capsulatus; culture on serum agar; X 1500.

Two short chains are surrounded by the characteristic mucoid capsules. Besides this there are biscuit-shaped diplococcus forms with poorly staining delicate capsules.

Fig. 5.—Streptococcus mucosus capsulatus; culture on serum agar; X 1500. Diplococcus and short chain forms; the slimy nature of the envelopes is demonstrated.

Fig. 6.—Pneumococcus; culture on serum agar; X 1500. Bacillary, elongated form.

Fig. 7.—Bacillus mucosus capsulatus; culture on agar; X 1500. Coccoid, cocco-bacilloid, bacillus, and diplo-bacillus forms. The poorly staining ends of the bacilli can be seen.

Fig. 8.—Mixed culture of b. mucosus capsulatus, and large contaminating unidentified bacillus. The mucoid character of the capsules and their tendency to break down are shown.

Fig. 9.—Bacillus mucosus capsulatus (Friedlaender) from the mouth; culture on Loeffler's medium; X 1500. Much smaller forms than those shown in figures 7 and 8.

Photomicrographs by Dr. F. S. Mandlebaum.

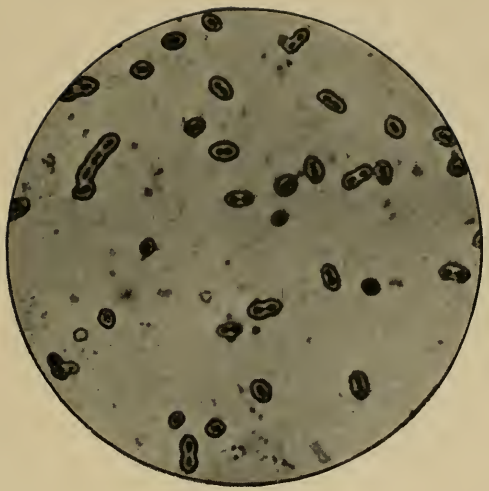

FIG. 1.

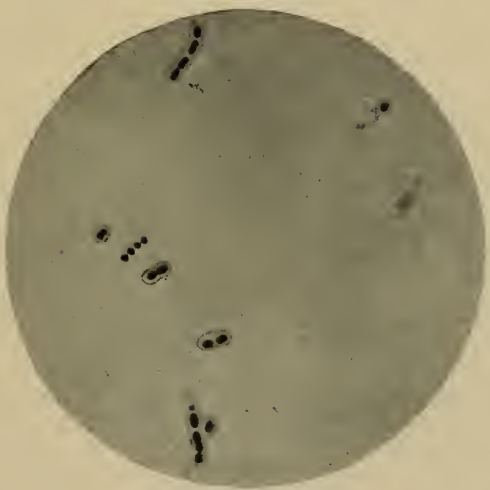

FIG. 2.

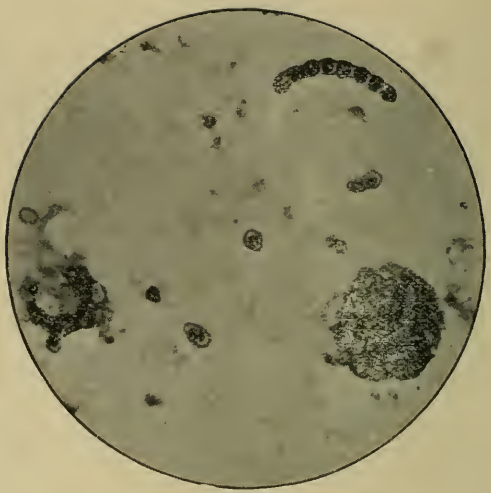

FIG. 3.

FIG. 4.

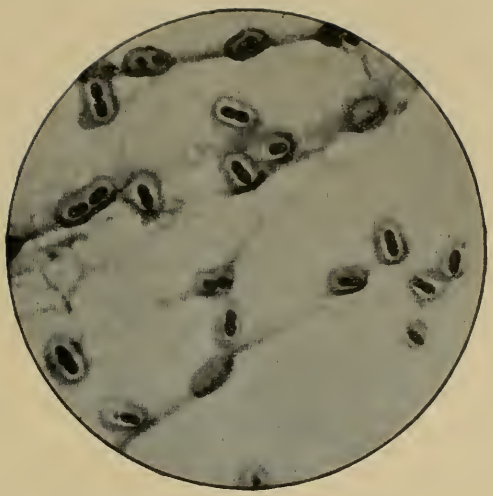

FIG. 5.

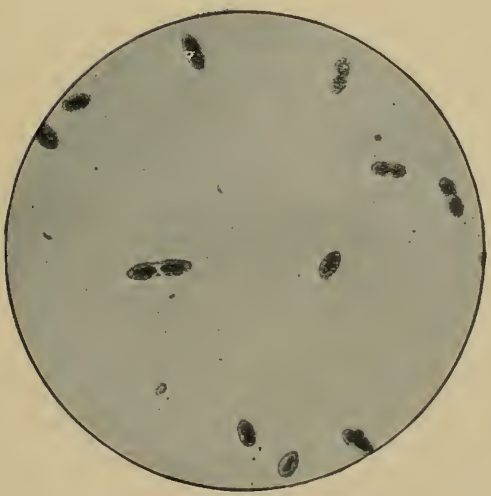

FIG. 6.

FIG. 7.

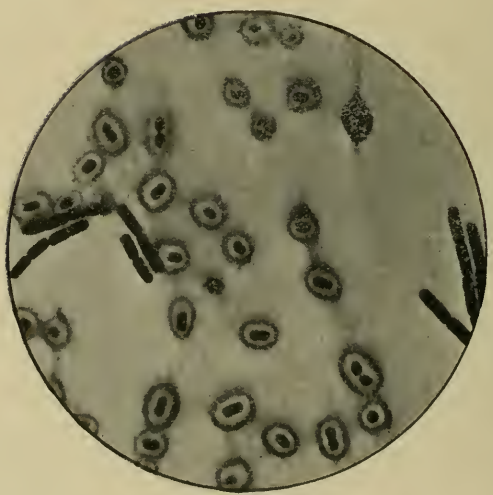

FIG. 8.

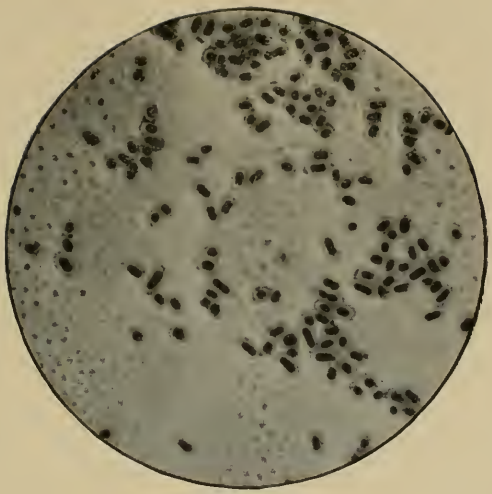

Fig. 9.

A SIMPLE METHOD OF STERILIZING BLOOD FOR CULTURAL PURPOSES.*

EUGENE P. BERNSTEIN AND ALBERT A. EPSTEIN.
FROM THE PATHOLOGICAL LABORATORY MT. SINAI HOSPITAL, NEW YORK.

Though great attention has been given of late to blood media, the necessity for a method of preparation which would make such media more widely applicable has been felt. Much of the difficulty hitherto experienced has been that of obtaining sterile blood readily and in quantities sufficient for universal use. This difficulty compelled various investigators to select widely different animals for their source of supply. Some even resorted to the use of commercial hemoglobin. The work, therefore, was varied and no standard blood media could be established.

After a series of experiments we have been able to devise a method by which the difficulties previously mentioned may be overcome. Numerous attempts have been made in the past to sterilize the blood to be used for cultural purposes, but of the methods so far introduced there is none which permits of sterilization without at the same time altering the character of the blood.

For the purpose of obtaining unchanged blood upon which the (so-called) hemolytic and other effects of bacterial growth could be determined, we resorted to the use of formalin as a sterilizing agent. We found that formalin could be used for this purpose without later exerting any inhibitory influence on the growth of bacteria. In order to prevent clotting of the blood ammonium oxalate was employed. The ease with which beef blood can be obtained in large quantities in any abattoir led us to the selection of this source of supply.

*Reprinted from the Journal of Infectious Diseases, Vol. III, No. 5, October, 1906.

As a result of our experiments we are prepared to present the following method as being the most satisfactory:

Four hundred c.c. of beef blood are drawn directly into a sterile Erlenmeyer flask of 500 c.c. capacity containing 30 c.c. of a 1 per cent. solution of ammonium oxalate (in distilled water) and ½ c.c. of formalin of 40 volume strength. The flask is then shaken for one or two minutes. Thirty minutes is the time required for the sterilization of the blood which is then transferred in small quantities into sterile Erlenmeyer flasks and diluted with twice its volume of sterile (0.9 per cent.) saline solution. This dilution reduces the actual formalin content to one part in 2,400 of blood.

According to our experiences it is best to allow this diluted blood to stand for 24 to 48 hours at room temperature before employing it for cultural purposes so as to allow for better diffusion of the formalin. The blood at this stage must receive the same care as any other sterile nutrient medium. The flasks are then sealed and stored on ice until needed.

In the preparation of our media we used the diluted blood in the proportion of one part to 15 of nutrient material (agar or broth). This quantity of blood we have found to be the optimum for showing character of growth, color changes, and hemolysis. The final product has an absolute formalin content of one part in 36,000. The ordinary laboratory organisms are found to grow very well on these media; and luxuriant growths of the pneumococcus, meningococcus, gonococcus, and influenza bacillus are readily obtained. Full details of various observations will appear in a later publication.

Throughout the entire procedure of sterilizing the blood there are no evidences of any gross or microscopic changes. It remains of the same scarlet color as when first drawn and the blood corpuscles are unaltered. This permits of the separation of the blood corpuscles from the serum which, if so desired, may be accomplished by centrifugalization or by allowing the blood to stand and washing the sedimented corpuscles in several changes of sterile salt solution. No doubt media prepared with washed corpuscles and those prepared with the entire blood will be found to give interesting cultural differences. In the use of the former any possible bactericidal effect of the serum would be eliminated.

It is necessary to state in this connection that an occasional beef will yield a blood which is of a deep crimson color. Such blood should not be selected for the work, as laking has occurred which naturally interferes with the study of hemolysis.

ON THE USE OF AMMONIUM OXALATE IN BLOOD-CULTURE TECHNIC.

By Albert A. Epstein, M.D.
FROM THE PATHOLOGICAL LABORATORY OF MOUNT SINAI HOSPITAL, NEW YORK.

Recent investigations in blood-culture work on special cases of infectious diseases (typhoid, for example) indicate clearly the necessity of making blood-cultures according to more than one method.[1] The routine blood-culture on six or eight different media is a relatively easy matter; more elaborate methods cannot be employed with ease at the bedside of the patient, either in the hospital ward or private house.

A complete cultural study of the blood requires a considerable outfit, the sight of which in certain cases excites fear in the patient and occasionally interferes with the asepsis necessary for the success of the culture. Apart from this minor consideration, the coagulability of the blood constitutes at times a real difficulty, and puts certain limitations on the work. It necessitates a rapid and complete distribution of the blood in the various media employed, and thus prevents its further manipulation and study. When a small quantity of blood is withdrawn from the patient (as may happen in cases with poor peripheral circulation, or in children) a uniform distribution of the blood is even more difficult, and the culture must at times be incomplete. Furthermore, the coagulability of the blood adds to the bactericidal action of its serum[2] and is thus detrimental to the growth of bacteria in positive cases. It is, therefore necessary to make the bedside procedure a simple one.

With this object in view, I introduced the use of a solution of ammonium oxalate, in conjunction with our routine blood-culture

[1] Libman: Johns Hopkins Hospital Bulletin, July, 1906.

[2] Conradi: Muench. Med. Woch. No. 34, 1906; Mueller and Graef: Muench. Med. Woch. No. 2, 1906.

work, by means of which some of the blood withdrawn is kept fluid, taken to the laboratory and studied in any manner desirable. Thus the results obtained by the latter method, were controlled by those obtained in the cultures made in the usual way. The present article comprises a description of the method and a preliminary report of the work done thus far.

The solution employed in this method is made up of the following ingredients:

Ammonium oxalate	2 grms.
Sodium chloride	6 grms.
Distilled water	1000 c.c.

The resulting solution is distributed into large test-tubes in quantities of 10 c.c. (measured accurately by means of a pipette or measuring funnel) and sterilized on three consecutive days, twenty minutes at a time. The level of the fluid in the tubes may be indicated by some mark. This serves to control the evaporation of the fluid. The tubes are then stored in cold until needed. It is best to make up fresh solutions every three or four weeks, as the oxalate is liable to undergo decomposition.

It is obvious from the above figures that the solution is approximately isotonic with the blood. The choice of ammonium oxalate as a decalcifying agent of the blood is based on some previous work in connection with the sterilization of blood,[3] in the course of which we have found that the oxalate was satisfactory for the purpose and exhibited (in the quantity used) no apparent detrimental influences on the viability or growth of bacteria.

The steps of the method are as follows: (1) About 10 c.c. of blood are withdrawn from a chosen vein, and (2) introduced into a tube containing 10 c.c. of the sterilized ammonium-oxalate-saline solution. (3) The mixture is then shaken thoroughly; or better still, poured into another sterile tube. The blood stays fluid. It is then taken to the laboratory and treated according to any or all of the methods suggested for blood-culture work.*

*The quantity of ammonium oxalate employed is really in excess of the needed amount. This is done so as to permit the use of larger amounts of blood than indicated above.

[3]Bernstein and Epstein: Journ. of Infectious Diseases, 1906.

The above method has so far been employed by us in 78 cases, taken from various patients. The results obtained with the ammonium oxalate method have been the same as those obtained with the controls. The bacteria encountered in our positive cases were the pneumococcus, streptococcus, staphylococcus, as well as the typhoid bacillus and bacillus coli communis. The phenomena exhibited by these bacteria in our control cultures (inclusive of the typhoid type colony),[4] obtained in the cultures made of oxalated blood.

The introduction of this method in blood-culture work is intended as an intermediate step whereby the preparation and work at the bedside may be reduced to a minimum; also to facilitate more extensive study of the blood than is possible with our present methods. In addition to the ease with which blood-cultures can be taken by this method, it offers other advantages. The oxalated blood may be centrifuged, spreads made from the sediment and examined microscopically for bacteria. In intense infections an early diagnosis can thus be made. The supernatant fluid obtained by centrifugalization can be employed for the determination of the opsonic index of the blood.

So far we have not had any experience in the application of this method to the attenuated organisms, such as the diplo- and streptococcus[5] of subacute endocarditis. Our series of cases has as yet been too small to prove conclusively that the method may be used safely in every case. Further studies of the method, however, are being carried on in our laboratory by Dr. Ryttenberg, the results of which will appear in a publication by him.

[4] EPSTEIN: Proc. New York Pathological Soc., Oct., 1906.
[5] LIBMAN: L.c.

THE VALUE OF AMMONIUM OXALATE IN BLOOD-CULTURE TECHNIC.*

By Charles Ryttenberg, A.B., M.D.,
PATHOLOGICAL INTERNE, MT. SINAI HOSPITAL, NEW YORK.

The value of blood-cultures as an important aid in diagnosis has been recognized for some time. Unfortunately most of the methods in use at present are associated with an elaborate set of media and require considerable skill in manipulation. It is, therefore, necessary to seek the services of one especially trained in blood-culture technic in order to obtain the best results. While many media may present no encumbrance in hospital work, there are objections to their use in private practice. Among these objections may be cited the inconvenience necessitated the operator, the possibility of contamination or breakage through knocks or jars of the carrying receptacle, and the apprehension aroused in the mind of the patient by the sight of so formidable an array of tubes, flasks, dishes, syringes, etc.

According to a simple method suggested by Epstein[1] as an intermediate step, it is possible to make the work easier and more practical. Equipped with a sterile syringe and needle, and a tube of the sterilized decalcifying agent, the practitioner may obtain the blood from the patient's vein under aseptic conditions, and subsequently send it to the laboratory for study. The advantages of this method are that it does away with bedside manipulation, the sight of which is so apt to strike terror into the heart of the patient; it prevents the coagulation of the blood and permits of its more equal distribution in the media, and allows the use of an unlimited

*Submitted as thesis for degree of Master of Arts, Columbia University, 1907.

[1]Amer. Journ. Med. Sci., Sept., 1907.

number of media in the laboratory. It also enables one to make spreads from a centrifugalized portion of the oxalated blood, whereby a clew or diagnosis as to the infecting organisms may often be reached at once—especially in the severe infections.

Epstein suggested the use of ammonium oxalate as a decalcifying agent some months ago, and the advantages set forth above. We began our observations at that time, using some or all of the media of our routine blood-culture set as a control. In most instances the same media were used in the two methods, but occasionally, when there was a large supply of oxalated blood, in addition to media analagous to those of the control (i.e., the routine set), special media were employed.

Our routine blood-culture method, introduced by Dr. E. Libman, consists in the use of flasks of plain bouillon (1% acid) and 2% glucose bouillon (1% acid), together with plates poured from the blood mixed with plain agar (1% acid), serum agar, 2% glucose agar, 2% glucose serum agar, 5% glycerin agar, and neutral plain agar. Corresponding flasks and plates from the oxalated blood were made from time to time, some at once, others at intervals of thirty minutes, one, two, three or five hours, depending upon the amount of blood withdrawn. Occasionally we have extended the intervals, plates at times being poured twenty-four hours after the blood had been obtained. In the intervals between platings the oxalated blood was kept in the thermostat at 37° C.

The observations recorded in this series number ninety unselected cases; a second and, at times, a third culture being made in the positive cases in order to obtain infected blood for testing the reliability of Epstein's method over extended periods of time.

The following table shows the variety of cases in which the ammonium oxalate was employed with references to the positive and negative cases:

Disease	Total No. of Cultures	Positive Blood-Cultures	Negative Blood-Cultures
Typhoid Fever*	28	8	20
Pneumonia†	16	2	14
Post-partum Infection	6	2	4
Streptococcemia	6	6	0
Suspected General Infection	4	3	1
Acute Pyosalpinx	3	1‡	2
Cerebro-spinal Meningitis	3	0	3
Endocarditis‡	3	3	0
Acute Mastoiditis	2	0	2
Suspected Meat Poisoning	2	0	2
Phlegmon of the Face	2	1	1
Acute Cholangitis	2	1	1
Gonorrheal Arthritis	2	0	2
Erysipelas	1	0	1
Appendicitis	1	0	1
Peritonitis	1	0	1
Erythema Multiforme	1	0	1
Hematuria	1	0	1
Subpectoral Abscess	1	1	0
Abscess of the Finger	1	0	1
Acute Mastitis	1	0	1
Empyema of Gall-Bladder	1	0	1
Liver Abscess	1	1	0
Infection of the Penis	1	1	0
Pyelitis	1	0	1

The decalcifying agent employed by Epstein is the following: Ammonium oxalate, 2 gms.; sodium chloride, 6 gms.; aq. destil.,

*Many of these cultures were taken in the fourth week of the disease. Our statistics on typhoid blood-cultures give positive results in a much higher percentage of cases than appears from the above figures.

†A positive pneumococcus infection is recorded in two places in the table, the case being one of lobar pneumonia super-imposed upon malignant endocarditis. The low percentage of positive cultures in the above table is due to the fact that most of said cultures were made after the crisis of the disease in order to determine whether the pneumococcus persisted in the blood.

‡This culture was obtained post mortem. Two previous cultures during life were negative.

1000 c.c. The resulting solution is distributed into large test-tubes in quantities of ten (10) c.c.—measured accurately by means of a pipette or measuring funnel—and sterilized for one hour on each of three successive days. The level of the fluid is indicated on the tube by a blue pencil mark which serves as a control on evaporation, and shows at a glance the relative amount of dilution of the blood after it has been added to the solution. The tubes are then stored in the ice-box until they are needed. Our experience has shown us that a fresh solution is preferable, so that our stock is renewed every third or fourth week.

The oxalate solution should never be used immediately after being taken from the ice-box, but should be allowed to stand at room temperature for some time or gently warmed. The cold solution may exert a detrimental effect on the organism sought, and by eliminating this factor the chances of a negative result are diminished.

The blood having been obtained from a vein—preferably from one in front of the elbow, though we have not infrequently sought them elsewhere under adverse conditions—with aseptic detail, it is introduced into the tube of oxalate solution after having previously sterilized the mouth of the tube in the flame of an alcohol lamp. The 10 c.c. of ammonium-oxalate solution are more than sufficient to decalcify 10 c.c. of blood, which was the the maximum amount used in any single tube because of the danger of contamination in case the blood-oxalate solution came in contact with the cotton plug. In cases where an unusual amount of blood was withdrawn that not employed in the control set of media, or in the first tube of oxalate solution, was introduced into a second. The mouth of the tube containing the blood-oxalate solution is then sterilized in the alcohol flame, the cotton plug replaced, and the tube gently shaken. This is sufficient to thoroughly mix the blood with the oxalate solution in cases where a moderate amount (2 c.c. to 5 c.c.) of blood has been obtained. When 6 c.c. to 10 c.c. are introduced into a single tube of the oxalate solution it has been my technic to pour the mixture into a sterile tube and back again into the original tube, with the usual precautions. In this way one can be sure of a more rapid and even distribution of the blood in the oxalate solution so

that all possibility of clotting is obviated, even though the coagulation time of the patient's blood be markedly diminished.

The main object of our investigations so far has been to determine whether the ammonium-oxalate solution exerts a deleterious or inhibitory effect upon organisms obtained in infected blood. While our series is as yet too limited for us to draw final conclusions, our results have on the whole been eminently satisfactory. We find that the organisms most frequently encountered in our series of cases, namely bacillus typhosus, micrococcus aureus, and streptococcus, are not affected at all by the oxalate solution; and it will be shown further on that they generally multiply during their stay in the tube of oxalate. Our work with the pneumococcus is too limited for an opinion to be expressed; in one case in which the control media showed an average per c.c. of blood of 4,750 colonies, the oxalate plates, two, which were poured twenty hours after the blood had been obtained, showed only 106 colonies per c.c. of blood. Unfortunately the patient was moribund at the time the culture was made, and so insufficient blood was obtained for extended observations. Through a misunderstanding, the plates from the oxalated blood were not poured after intervals of one and two hours as had been intended, and the death of the patient precluded a subsequent blood-culture. While this case is of interest, it does not reflect upon the method; for it will be the exception, rather than the rule because the interval in practice between the time the blood is obtained and the time it reaches the laboratory is never more than two or three hours.

The presence of few or many bacteria in the blood has been of some significance in our study. In those cases where very few organisms—in several cultures a single bacterium—are withdrawn in the sample of blood, the particular medium that may receive the one or few organisms is naturally a matter of accident or chance. On some occasions this favored medium has been one of the control set, on others one of the oxalate series. For example, one of our positive typhoid cases gave the following results (B. C. 866):*

Control Series.—Flask A—1½ c.c. of blood in a flask of 120 c.c. plain bouillon. Flask B—1½ c.c. of blood in a flask of 120 c.c. 2%

*B. C. means Blood Culture.

glucose bouillon. Plate 3a—1½ c.c. of blood on a plate of 2% glucose agar. Plate 3b—1½ c.c. of blood on a plate of 2% glucose agar.

Oxalate Series.—Poured at once: Plate 3x1—1½ c.c. of blood on a plate of 2% glucose agar. Plate 7x1—1½ c.c. of blood on a plate of 2% lactose agar. Poured after one hour: Plate 3x2—1½ c.c. of blood on a plate of 2% glucose agar. Flask Bx—1½ c.c. of blood in a flask of 120 c.c. 2% glucose bouillon. Poured after four hours: Plate 3x3—1½ c.c. of blood on a plate of 2% glucose agar. Poured after five hours: Plate 3x4—2 c.c. of blood on a plate of 2% glucose agar. Plate 7x2—1½ c.c. of blood on a plate of 2% lactose agar. Poured after seven hours: Plate 3x5—2 c.c. of blood on a plate of 2% glucose agar. Poured after eight hours: Plate 3x6—2 c.c. of blood on a plate of 2% glucose agar. Plate 7x3—1½ c.c. of blood on a plate of 2% lactose agar.

Flask A (control series) showed Gram-negative motile bacilli in forty-two hours, these being proven subsequently culturally and by agglutination B. typhosus; the rest of the media of the control series and all of the oxalate series were negative after five days, which is the usual period covering our observations of a single blood-culture. In another case, one of suppurative cholangitis (B. C. 839), the routine media were used as a control, two flasks of bouillon—one plain, the other containing 2% glucose—each received 2 c.c. of suspected blood; agar, serum agar, 2% glucose agar, 2% glucose serum agar, 5% glycerin agar and neutral plain agar, each were mixed with 1 c.c. of the same blood, and plates poured. Plates analogous to the three first mentioned were made from the oxalated blood two hours after it had been withdrawn. On the fourth day one small white colony appeared on the 2% glucose-serum-agar plate of the control series, this being later identified as an atypical streptococcus conforming in all cultural respects to a similar organism isolated from the blood of the same patient in a subsequent blood-culture (B. C. 846), so that all doubt as to the reliability of the first culture is thus removed. In still another case—one of streptococcemia of unknown origin—the oxalate series alone was employed (B. C. 813), the following distribution being effected about one hour after the blood had been obtained:

Oxalate Series.—Flask Ax—2¼ c.c. of blood in a flask of 120 c.c. plain bouillon. Flask Bx—2¼ c.c. of blood in a flask of 120 c.c. 2% glucose bouillon. Flask Cx—2½ c.c. of blood in a flask of 120 c.c. litmus milk. Plate 1x—1½ c.c. of blood on a plate of plain agar. Plate 2x—1 c.c. of blood on a plate of plain agar serum. Plate 3x—1¼ c.c. of blood on a plate of 2% glucose agar. Plate 4x—2 c.c. of blood on a plate of 2% glucose agar serum. Plate 5x—1¼ c.c. of blood on a plate of 5% glycerin agar. Plate 6x—1 c.c. of blood on a plate of neutral plain agar.

Flask A and all the plates were negative after five days. Flasks B and C showed Gram-positive cocci and chains in 48 hours—these proving to be streptococci, conforming to the organisms obtained from the blood of the same patient in three other cultures (B. C. 809, 828, 857). A final case to show the role played by chance in one of our typhoid series (B. C. 730):

Control Series.—Flask A—1½ c.c. of blood in a flask of 120 c.c. plain bouillon. Flask B—1½ c.c. of blood in a flask of 120 c.c. 2% glucose bouillon. Plate 3a— 1c.c. of blood on a plate of 2% glucose agar. Plate 3b—2 c.c. of blood on a plate of 2% glucose agar.

Oxalate Series.—Distribution after two hours: Flask Ax—1½ c.c. of blood in a flask of 120 c.c. plain bouillon. Flask Bx—1½ c.c. of blood in a flask of 120 c.c. 2% glucose bouillon. Plate 3x—1½ c.c. of blood on a plate of 2% glucose agar.

Of the control series, flask A showed growth in 48 hours; flask B and the two plates were negative at the end of five days.

Of the oxalate series, flask Ax showed growth in 48 hours; flask B remained negative; plate 3x showed one typhoid "type colony"[2] in 48 hours.

When many organisms are present in the blood, the oxalate series as a rule shows a corresponding number of colonies to the control, often an increase of considerable significance, seldom a diminution. As regards an increase in the number of organisms, the following cases are instructive. The first was one of fatal blood infection by the micrococcus aureus (B. C. 725) following an infected abrasion on the penis.

[2]Epstein: Transactions of the N. Y. Pathological Society, Oct., 1906.

Control Series.—Plate 1a—¾ c.c. of blood on a plate of plain agar. Plate 1b—½ c.c. of blood on a plate of plain agar. Plate 1c—¼ c.c. of blood on a plate of plain agar.

Oxalate Series.—Poured at once: Plate 1x1—¾ c.c. of blood on a plate of plain agar. Poured after two hours: Plate 1x2—¾c.c. of blood on a plate of plain agar. Poured after five and one-half hours: Plate 1x3—¾ c.c. of blood on a plate of plain agar.

The results may be tabulated as follows:

Plate,	No. of colonies per plate.	No of colonies per c.c.
1a	87	118
1b	48	
1c	37	
1x1		140
1x2		196
1x3		212

It will be noted that the plates poured from the oxalated blood at different periods show a gradual increase.

A case of post-partum infection, likewise due to the micrococcus aureus (B. C. 724), shows a more radical increase in the number of colonies :

Control Series.—Plate 1—1 c.c. of blood on a plate of plain agar. Plate 3—½ c.c. of blood on a plate of 2% glucose agar.

Oxalate Series.—Poured at once: Plate 1x1—1½ c.c. of blood on a plate of plain agar. Plate 3x—1½ c.c. of blood on a plate of 2% glucose agar. Poured after two hours: Plate 1x2—½ c.c. of blood on a plate of plain agar. Poured after four hours: Plate 1x3—½ c.c. of blood on a plate of plain agar. Poured after seven hours: Plate 1x4—¾ c.c. of blood on a plate of plain agar.

The number of colonies per c.c. of blood were the following:

Control Series.—Plate 1—264. Plate 3—222.

Oxalate Series.—Plate 1x1—294. Plate 3x—Too numerous to be counted. Plate 1x2—720. Plate 1x3—744. Plate 1x4—Too numerous to be counted.

Another case of post-partum infection, in this instance due to the streptococcus (B. C. 870), shows a very striking advantage that the oxalate series presented over the control.

Control Series.—Flask B—1½ c.c. of blood in a flask of 120 c.c.

2% glucose bouillon, growth in 48 hours. Plate 1—1¼ c.c. of blood on a plate of plain agar, negative five days. Plate 2—1 c.c. of blood on a plate of plain agar serum, one colony. Plate 3—1 c.c. of blood on a plate of 2% glucose agar, negative. Plate 4—1 c.c. of blood on a plate of 2% glucose agar serum, negative.

Oxalate Series.—Poured after one hour: Flask Bx1—1½ c.c. of blood in a flask of 120 c.c. 2% glucose bouillon. Plate 1x1—1½ c.c. of blood on a plate of plain agar. Plate 3x1—1¼ c.c. of blood on a plate of 2% glucose agar. Poured after six hours: Plate 3x2—1¼ c.c. of blood on a plate of 2% glucose agar. Plate 3x3—1 c.c. of blood on a plate of 2% glucose agar. G. S. B.*—1 c.c. of blood in a tube of 10 c.c. glucose serum bouillon. Poured after eight hours: Flask Bx2—1½ c.c. of blood in a flask of 120 c.c. 2% glucose bouillon. Plate 3x4—1¼ c.c. of blood on a plate of 2% glucose agar. Plate 3x5—1 c.c. of blood on a plate of 2% glucose agar. Poured after twenty hours: Plate 1x2—1¼ c.c. of blood on a plate of plain agar. Plate 3x6—¾ c.c. of blood on a plate of 2% glucose agar.

The tabulated data for the oxalate series is as follows:

Bx1, growth in 17 hours; 1x1, two colonies; 3x1, negative (five days).

3x2, 10 colonies; 3x3, 11 colonies; G. S. B., growth in 48 hours.

Bx2, growth in nine hours; 3x4, eight colonies; 3x5, seven colonies.

1x2 and 3x6, colonies too numerous to be counted.

In our study of typhoid infections, it is not uncommon to note an increase in the number of colonies on the glucose plates poured from the oxalated blood. The data in a single case (B. C. 829) will be cited by way of illustration, for this disease being one associated with relatively few bacteria in the blood, the particular medium to which one bacillus or more may be added is largely a matter of chance.

Control Series.—Flask B—2 c.c. of blood in a flask of 120 c.c. 2% glucose bouillon. Plate 3a—2 c.c. of blood on a plate of 2% glucose agar. Plate 3b—2 c.c. of blood on a plate of 2% glucose agar.

*G. S. B. means glucose serum bouillon.

Oxalate Series.—Poured after 30 minutes: Plate 3x1—2 c.c. of blood on a plate of 2% glucose agar. Plate 3x2—2 c.c. of blood on a plate of 2% glucose agar.

Results:

Medium	19 hrs.	48 hrs.	72 hrs.	96 hrs.
B	neg.	neg.	neg.	neg.
3A	1 "type" colony	same	same	same.
3B	3 "type" colonies	"	"	"
3x1	4 "type" colonies	"	"	"
3x2	5 "type" colonies	"	"	"

We have other cases in our series showing an increase in the number of bacteria during their stay in the ammonium-oxalate solution, but the cases mentioned are sufficient to demonstrate this point. In regard to the oxalate series tallying with the control, two cases will be cited. The first was one of streptococcemia (B. C. 771), in which the following media were used:

Control Series.—Flask A—1½ c.c. of blood in a flask of 120 c.c. plain bouillon, growth. Flask B—1½ c.c. of blood in a flask of 120 c.c. 2% glucose bouillon, growth. Plate 1—2 c.c. of blood on a plate of plain agar, 400 col. per c.c. Plate 2—1½ c.c. of blood on a plate of plain agar serum, 310 col. per c.c. Plate 3—1 c.c. of blood on a plate of 2% glucose agar, 560 col. per c.c. Plate 4—1½ c.c. of blood on a plate of 2% glucose agar serum, 309 col. per c.c.

Oxalate Series.—Poured at once: Flask A—1½ c.c. of blood in a flask of 120 c.c. plain bouillon, growth. Flask B—1½ c.c. of blood in a flask of 120 c.c. 2% glucose bouillon, growth. Plate 1x—1½ c.c. of blood on a plate of plain agar, 330 col. per c.c. Poured after one hour: Plate 4x—1½ c.c. of blood on a plate of 2% glucose agar serum, 373 col. per c.c.

If plates 1x and 4x be compared with the similar plates of the control it will be found by averaging that the two plates of the control present 354 colonies per c.c., those of the oxalate series showing 351 colonies per c.c. The two flasks of the oxalate series show growth as do those of the control.

The second case to be cited was one of lobar pneumonia complicating endocarditis (B. C. 806).

Control Series.—Flask A—2 c.c. of blood in a flask of 120 c.c. plain bouillon; after 13 hours, growth. Flask B—2 c.c. of blood in a

flask of 120 c.c. 2% glucose bouillon; after 13 hours, growth. Flask C—1¾ c.c. of blood in a flask of 120 c.c. litmus milk; after 13 hours, growth. Plate 1—1¼ c.c. of blood on a plate of plain agar, 17 colonies per c.c. Plate 2—1½ c.c. of blood on a plate of plain agar serum, 24 col. per c.c. Plate 3—2 c.c. of blood on a plate of 2% glucose agar, 41 col. per c.c. Plate 4—1½ c.c. of blood on a plate of 2% glucose agar serum, 38 col. per c.c.

Oxalate Series.—Poured after 30 minutes: Plate 1x—1½ c.c. of blood on a plate of plain agar, 18 col. per c.c. Plate 3x—1½ c.c. of blood on a plate of 2% glucose agar, 38 col. per c.c.

A remarkable reduction in the number of organisms obtained in a sample of infected blood is shown in a case of fatal malignant endocarditis due to the pneumococcus (B. C. 763), and referred to before.

Routine Series.—Flask A—1 c.c. of blood in flask of 120 c.c. plain bouillon. Flask B—1 c.c. of blood in flask of 120 c.c. 2% glucose bouillon. Plate 1—1 c.c. of blood on a plate of plain agar. Plate 2—1 c.c. of blood on a plate of plain agar serum. Plate 3—1 c.c. of blood on a plate of 2% glucose agar. Plate 4—1 c.c. of blood on a plate of 2% glucose agar serum. Plate 5—1 c.c. of blood on a plate of 5% glycerin agar. Plate 6—1 c.c. of blood on a plate of neutral plain agar.

Oxalate Series.—Poured after *twenty hours*: Plate 1x—¾ c.c. of blood on a plate of plain agar. Plate 3x—¾ c.c. of blood on a plate of 2% glucose agar.

After twelve hours the following data were recorded concerning the routine series:

A and B, Gram-positive diplococci; (1) 5,100 colonies; (2) 4,400 colonies; (3) 4,800 colonies; (4) 4,700 colonies; (5) 5,500 colonies; (6) 3,900 colonies.

After a corresponding incubation period the oxalate series showed the following: 1x, 76 colonies; 3x, 84 colonies.

As no oxalate plates were poured at the time the blood was withdrawn, or at intervals subsequently, we have nothing with which to compare those plates poured after the lapse of twenty hours. We would naturally expect the number of colonies on plates poured after such a long interval to be too numerous to be counted, but in

this case the bactericidal action of the serum evidently exerted an unfavorable influence. On the other hand, the viability of this particular strain of pneumococcus may have been poor. In our limited work with the pneumococcus we have found thus far that it is the organism least likely to multiply in the blood-oxalate solution. It is unfortunate that no plates were poured in the above cultures after an hour or two, as it is clear that in practical blood-culture work the oxalated blood would be used within that time. The experiments in inoculating media at long intervals were made from a more theoretical standpoint, and also with the object in view of adding to our knowledge of the bactericidal effect of the blood.

The phenomena of hemolysis as produced by the streptococcus, and often by the micrococcus aureus, are in no way interfered with by the ammonium-oxalate solution. Likewise the appearance of the typhoid "type colony" on the 2% glucose agar plates of the oxalate series is identical with that on the control plates of the same medium. With the pneumococcus we have observed hemolysis on some media and zones of green coloration surrounding the colonies on others, analagous plates in the two methods presenting identical features. With B. mucosus capsulatus observations on glucose agar plates, as regards the production of zones of green coloration about the deep colonies and later zones of precipitation, indicate that corresponding phenomena are displayed in the two methods. It is, therefore, reasonable to assume that with other organisms we may expect to find that the oxalate method will show features in no way different from those seen in blood media poured in the usual way.

We have not as yet encountered the attenuated diplococcus and attenuated streptococcus associated with endocarditic lesions,[3] nor the gonococcus nor meningococcus, so that data as to their behavior in the oxalate solution cannot be supplied at the present time. Neither has B. proteus nor B. paratyphosus been isolated from the blood since we began our investigations with the oxalate solution. As regards those last mentioned we feel safe in claiming that the decalcifying agent employed will not exert a deleterious effect. In one of our post-mortem blood-cultures (B. C. 824), in which control media

[3]LIBMAN: Bulletin of the Johns Hopkins Hospital, July, 1906.

were not used, B. coli was isolated from the heart's blood together with the micrococcus aureus and streptococcus. About eight c.c. of blood were introduced into a tube of sterile ammonium oxalate solution with the usual precautions, and at the conclusion of the autopsy, about forty minutes later, the following media were inoculated with the oxalated blood:

Flask Bx—2 c.c. of blood in a flask of 120 c.c. of 2% glucose bouillon. Plate 1x—1½ c.c. of blood on a plate of plain agar. Plate 2x—1½ c.c. of blood on a plate of plain agar serum. Plate 3x—1½ c.c. of blood on a plate of 2% glucose agar. Plate 4x—1½ c.c. of blood on a plate of 2% glucose agar serum.

All the media employed showed the three organisms mentioned above. The following table indicates the number of colonies of each as recognized on the plates:

Bacterium	No. of colonies after 12 hrs	No of colonies after 36 hrs.
Streptococcus:		
(1x)	17	27
(2x)	11	15
(3x)	15	18
(4x)	4	5
Micrococcus aureus:		
(1x)	—	13
(2x)	—	14
(3x)	10	14
(4x)	10	10
B. coli:		
(1x)	3	6
(2x)	1	9
(3x)	—	4
(4x)	—	3

Total number of colonies per plate after 36 hours: 1x, 30; 2x, 38; 3x, 36; 4x, 18.

Not having employed a control in this instance we cannot judge as to whether there was any diminuation in the number of colon bacilli, but we are inclined to believe there was not, as this organism is a hardy one. The green coloration about the colonies on the glucose agar and glucose serum agar plates, together with the bubbles of gas resulting from the fermentation of the sugar were altogether similar to the same phenomena observed on those media in our

recorded bacillus blood-cultures prior to the introduction of Epstein's method.

In summarizing the work done thus far, I consider it safe to use the ammonium-oxalate solution in suspected infections by B. typhosus, micrococcus aureus and streptococcus; subsequent studies will probably add to this group B. coli, B. proteus, and B. paratyphosus; whether the pneumococcus can be included or not, further investigation must determine. The less frequent invaders of the blood, —the gonococcus, meningococcus, the attenuated diplococcus and the attenuated streptococcus—require separate study. The simple method suggested by Epstein as an intermediate step in blood-culture work promises encouragement to the more general use in private practice of blood-cultures as a diagnostic measure.

NOTE.—I wish to thank Dr. E. Libman for suggestions and Dr. A. A. Epstein for the privilege of working out his method in detail. I am also indebted to Dr. Epstein and to Dr. J. J. Hertz for the data in some of the cases comprised in my series.

A NEW METHOD OF PREPARING AGAR-AGAR MEDIA.*

By John Canary.

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The advantage of the method which I wish to give in this paper is the rapidity with which the filtration can be accomplished, the resultant medium being perfectly clear. I will describe the method as applied to the making of three liters of agar, the amount which I am usually accustomed to prepare at once.

Three liters of water (tap water will do) are allowed to boil for two minutes. The agar (20 grams to the liter or more if desired) is cut into small pieces in this water, and the mixture is allowed to stand for 15 minutes. It is then put upon the fire, again boiled for a few minutes, and the meat extract, peptone and salt are successively added. By this time the agar is completely dissolved. The proportions of these to three liters of water are: Meat extract, 12 grams; peptone, 30 grams; salt, 15 grams.

The peptone should be added slowly. After these ingredients have been added, 20 c.c. of normal sulphuric acid are added and the mixture is brought to a boil for one minute. It is then cooled down to 50° C. The whites of eight eggs are then added. If only two liters of agar are to be made, six eggs should be used; for one liter the whites of three eggs. Before adding the whites of the eggs they are mixed up with about 20 c.c. of water. After adding the whites of the eggs to the medium the whole should be well shaken so that the egg is well distributed. The flask is then put into the steam sterilizer for two hours. After this the mixture is filtered through a layer of cotton which has been thoroughly soaked with hot water. In pouring from the flask one should hold back the egg as much as possible and pour simply the clear fluid. This is not difficult

*Presented to the New York Pathological Society, Oct., 1905.

to do as the egg has usually coagulated into one large mass. The filtration of three liters can usually be accomplished in five minutes.

After titrating and finding that the medium is of the right titre (with this method the medium is usually 1 per cent. acid to phenolphthalein), the fluid is poured into 500 c.c. flasks and sterilized in the usual way for four days in order to throw down all possible precipitate. (Three days' sterilization or less will suffice if one is not particular about having an absolutely clear medium.) Before tubing the medium it is again filtered through cotton. The resultant product is a perfectly clear medium of proper consistency.

NOTES.

(1) If the meat infusion is to be used the method is carried out in the same way as above described, except that no meat extract is added. The peptone, agar and salt are added directly to the meat infusion.

(2) In preparing the medium a flask should always be used which is at least one liter larger than the amount of medium to be made up. For making three liters of agar it is best to use a five-liter flask. This allows the medium to be more easily poured for filtration.

(3) Hydrochloric acid can be used instead of sulphuric acid, but the precipitate later thrown down in the flasks is more abundant.

(4) The reaction of the finished medium, as mentioned above, is usually about 1 per cent. acid, the mixture before adding the egg and boiling usually being 1.3 to 1.5 per cent. acid. After adding the egg and boiling it usually becomes 0.3 per cent. less acid. One can, of course, if one fears that the mixture is not 1.3 to 1.5 per cent. acid (which is the best titre at which to boil the agar), titrate before boiling and add acid or alkali as the case may require.

(5) It is advisable to have the white of the egg as free from yolk as possible.

(6) A bit of curved wire in the bottom of the funnel will prevent the cotton from sagging into the stem of the funnel.

(7) If only one or two liters of agar are to be made, the medium need be kept in the sterilizer only from one hour to one and one-half

hours instead of two hours; even when three liters are to be made a shorter period than two hours often suffices.

This method of preparing agar has been in use in the laboratory for two years and has been found satisfactory.

THE COMPOSITION OF FLUIDS FROM ASCITES AND OTHER SEROUS FLUIDS.

By S. Bookman, M. A., Ph. D.

On account of the large number of analyses made in this laboratory during the past few years, it was deemed advisable to give the results of the findings obtained, and I herewith tabulate the results in percentages.

Material	Gr.	Proteid	Total Solids	Inorg. Solids	NaCl	Extractives	Fat	Urea
Serum from Nephritic Anasarca, W. A., No. 214		0.8225%	1.446%	.11%	0.69%			T race
Ascitic fluid, S. F., 456		2.826%	4.05%	0.942%	0.644%			0.016%
Ascitic fluid, H. S., 492	1.01405	3.831%	4.918%	0.80%	0.585%			0.018%
Polyserositis, H. S., 321	1.0128	4.0%	4.93%	0.94%	0.656			0.045%
Hodgkin's Disease, C. B., 516		1.964%	2.71%	0.94%	0.583			0.0237
Nephritis and Emphysema, J. K., 492								0.063%
Ascitic fluid, Abdominal Tumor, J. M. 614	1.00983	2.59%	3.738	0.814	0.632	0.666%	0.043%	
Abdominal fluid, Tubercular Peritonitis or Carcinoma of Intestines, S. S., 622		4.125%	5.28%	0.69%	0.585	0.37%	0.116%	
Ascitic fluid Carcinoma of Peritoneum, J. M., 623		1.625%	3.32%	0.89%	0.58	1.27%	0.42%	
Abdominal Neoplasm, S. R., 624	1.00604	1.556%	2.344%	0.932	0.679			
Chronic Nephritis, Ascitic fluid, H. 28, June 9, 1906	1.00373	0.544%	1.126%	0.952	0.673	0.2135	0.018	

Material			Total Solids	Inorg. Solins	NaCl	Extract-ives	Fat	Urea
Ditto, Ditto, H. S., 661, July 2, 1906	1.00293	0.445%	1.194%	0.718	0.605	0.255	0.032	
Blood serum, Nephritis, J. T., 679.....	1.02035	7.1925%	9.05%	0.522	0.626	0.86%		0.066%
Fluid from Chest, E. R., 690.....	1.00676	1.522%	2.342	0.685%	0.76	0.074	0.032	
Blood serum Nephritis, J. T., 692.....	1.01896	6.449%	7.752%	0.716	0.605	0.83%		
Pleural fluid, Chronic Nephritis, 693....	1.0148	3.306%	3.996%	0.896%	0.684%	0.487	0.015	0.063%
Ascitic fluid Tumor, B A., 700.....	1.012	3.167	4.35%	0.73%	0.632	0.099	0.0108	
Ascitic fluid, Carcinoma of Ovary, R. W. 753.....	1.018	5.565%	6.656%	0.806%	0.597	0.5095	0.058	0.0068
Blood serum, Pneumonia, D. B , 798.....	1.02493	8.356%	9.72%	0.682%	0.608	1.211		0.009%
Ascitic fluid, Nephritis, B. R., 834, Dec. 1, 1906.....	1.01005	1.875%	4.42%	0.96%	0.690%	0.3998	0.0644	0.048
Ditto, Ditto, B R., 835, December 8, 1906.	1.00775	1.40%	2.084%	0.836%	0.6435	0.3736	0.0542	0.045
Pleural fluid, Chronic Endocarditis, Pleurisy with Effusion, R. B., 867...	1.00856	2.25%	2.976	1.072	0.673	0.406	0.0168	0.025
Abdominal fluid, Nephritis, G. G. 904....	1.00755	1.479	2.024	1.032	0.737	0.362	0.063	0.022
Ascitic fluid, Tubercular Peritonitis and Cirrhosis of liver, L. W., 940, Feb. 5, 1907.....	1.0172	4.863%	5.704%	0.92%	0.592%	0.518%	0.028%	0.024
Ditto, Ditto, L. W. 961, Feb. 14, 1907....	1.0157	4.306	5.346	0.812	0.62	0.3249%	0.0265	
Ascitic fluid, Abdominal Neoplasm, A. G., 967.....	1.019	6.106	7.002	0.552	0.408	0.518	0.048	

With the exception of the last case, it will be noticed within what close limits lie the NaCl contents of these fluids, notwithstanding the wide divergences of the other constituents present.

We find but few of these analyzes in pathological chemical literature and at some future time there will appear a more extended and more specific paper upon this subject, when more material has been furnished than appears in this contribution. At that time it will probably be more reasonable to draw conclusions as to the nature of and the reasons for the wide fluctuations of the different constituents present in different pathological conditions; in fact we may then be able to more accurately identify some of the phenomena exhibited in the pathological processes going on in the diseased organs themselves.